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Development and Classroom Learning

An Introduction to Educational Psychology

J. M. Stephens & E. D. Evans

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An Introduction to Educational Psychology

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Preface

The two authors of this book have attempted to bridge an extensive generation gap. The older writer (Stephens) now leads a life of retirement in daily association with his keenly individualistic adolescent grandson. The younger (Evans), intensely immersed in immediate educational activities, is the father of two daughters just beginning the early primary grades.

The experience of reaching out across that gap has been most rewarding. With such a combination, any idea proposed has inevitably been inspected both for its present-day relevance and for its place in the long-range pattern of psychological thought.

In spite of our specialties—child development for the younger author, the psychology of learning for the older—we have both had much to say about all chapters, and responsibilities for content would be difficult to disentangle. The actual phrasing of the ideas has been the work of the senior author.

This book deals with the psychology of the important processes at work within the classroom. It attempts to use psychology to help the teacher in understanding the developing student, in directing academic achievement, in promoting the development of character, and in aiding in the attainment of personal adjustment.

During recent years a huge quantity of relevant data has come to light. Verbal learning has become a whole discipline, and its classroom implications are exciting indeed. Reinforcement psychology has recruited its own camp of enthusiastic workers, and these researchers have turned out a flood of materials on programming, on the acquisition of skill and morality, and on the promotion of personal adjustment. The claims of structure confront us at every turn, and, within a few years, the name of Piaget has rocketed from neglect to enshrinement. Creativity has become a way of life. The work on socialization and character formation has reached new levels of sophistication and rigor. Psychological ideas have been applied in bolder and bolder fashion to the basic nature of schooling and to the place of schooling in the larger social order.

In applying this new work to the areas of academic attainment and the acquisition of skill (Part II) we have stressed some radical modifications of earlier notions, especially in the areas of motivation, practice, and reinforcement and in the hierarchical arrangement of abilities. But there has been no neglect of the impressive continuities that unite the bright new ventures with older practices. These continuities link the textbook with the teaching machine and the computer; the insightful grasp of structure with the rote memorization of arbitrary units; and the mundane acquisition of conventional material with the enthusiastic pursuit of creativity. There has been a sustained effort to work out some useful structure that will embrace both old and new. Without some such structure, a misleading modernity might arise. There may be danger of suggesting that unless the data represent the very last word they have no claim on our attention.

A brief overview of theoretical positions tries to show the relevance of theory for the classroom and to place the classical and the humanistic approaches in broad perspective.

In looking at character development and the converse problems of drugs, violence, and racism (Part III), we have noted the classical controversies among early theorists. The emphasis, however, is on the more current seminal notions that try to introduce some structure and order into the deluge of recent data. In this area we have worked hard to develop defensible practical applications.

The psychological facts, old or new, are presented with score upon score of classroom application. Few writers who have spent years in the classroom can look at psychological facts or principles without thinking of classroom implications. And, between them, the two authors have had a wide range of classroom experience. This overall experience includes classroom teaching in one-room rural schools, in elementary school, in secondary school, and in college and university. It also includes the nonclassroom experience of the counselor, the supervisor, and the principal. These well-remembered encounters with stern educational realities produce an inevitable urge to examine the realistic significance of any psychological notion.

This urge to supply classroom examples of psychological matters should be useful not only in its own right but in helping the reader to decide whether or not he really understands a principle or concept. Very often the meaningfulness of an idea lies in its power to generate practical implications. If these don't seem to make sense, the idea itself might well be reexamined.

The lavish use of practical examples has its dangers along with its hoped-for advantages. Unless the reader is frequently reminded of the data from which the principles and examples arise, the treatment may suggest a series of fatherly talks based merely on experience and common sense. To avoid this danger and to reduce these fireside overtones, we have gone to some trouble to call attention to the all-important data or principles—the things which the applications merely serve to illustrate. The frequent parenthetical references should suggest that a given statement is based on some source and is not merely derived from personal opinion or common sense. For the typical student these interspersed references will do this and little more. The instructor or advanced student, of course, may wish to consult the reference itself to see if he agrees with our interpretation.

For more effective reminders of data and the part they play, we have made much use of boxed summaries of representative studies. These portray the basic undigested material from which the discussions are derived. Different instructors will treat these boxes in different ways. Some instructors may merely treat them as the odds and ends that one puts on the bulletin board or leaves lying around the room—to elaborate a point, or to drive it home; to elicit a moderate, relevant puzzlement; or to introduce a salutary note of dissent when the tone of the discourse may sound too dogmatic.

There is much to be said for this easygoing approach. Students often get more out of such incidental items if we don't make too much of them and if we are not too heavy-handed in pointing the moral. True enough, a really important item might be missed with this approach. Whenever a box deals with a crucial concept, however, that concept is also treated explicitly in the adjoining text.

But other approaches are also in order. Some instructors, for example, may make systematic use of the boxes to remind the student that the interpretation of research is difficult and precarious and that definite advice does not emerge automatically and unambiguously from the data themselves. To fit in with this important use, the box itself is typically limited to data and includes little or nothing in the way of interpretation. The student can thus be encouraged to draw his own conclusions and to see if these agree with the general treatment in the text. At times he will find that they do not. Part of this discrepancy, of course, will come from the inevitable leeway in deriving conclusions. Some of it is contrived. A few boxes are deliberately selected to qualify or to modify the general trend of the exposition. In such instances, of course, the qualification is not considered essential. If it were missed the distortion would not be serious.

In many ways the book is strongly teacher centered. It begins with the teacher's job and functions. It ends with the teacher's emotional reaction to his work. Emotional reactions, be it noted, include not only worries that call for adjustment but the positive feelings of zest, excitement, and satisfaction that are to be enjoyed and exploited.

The teacher-centered approach is also seen in the suggestions for dealing with individual differences (Chapter 11) and in the frequent mentions of spontaneous, primitive forces that the teacher unthinkingly brings to his work. The latter reminders reflect the senior author's controversial claim that our ancient and vital craft is partly based on powerful "bio-programs" built into all human beings by unremitting evolutionary demand.

In the writing of a book such as this many people are pushed around. As in the past, Olive Stephens has had to absorb into her complex schedule the arduous responsibilities of typing and of keeping track of scores of details. Alma Calhoun has frequently been prevailed upon to drop everything and rush over the miles to help in some emergency.

But the very demands of joint authorship have brought rich rewards. The necessary consultations called for frequent trips by land and sea through the breathtaking scenery of the, as yet, uncrowded Northwest. They also served as the effective occasions for two families to come together for frequent delightful interchanges.

Gratitude of a less personal nature goes to a large number of professional colleagues and sagacious editors. Among these we list L. R. Goulet, Philip W. Jackson, Verne Keenan, Arlene Richards, and Albert H. Yee.

Shawnigan Lake J. M. S.
British Columbia
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Contents

PREFACE v

Part I Teacher and Student 1

1. What Teaching Is Like 3

2. General Child Development and the Use of Language 31

Some General Patterns of Development 33
The General Concept of "Stages" in Development 42
Language Development 46

3. Development of Intelligence and Cognitive Skill 63

Conceptual Tempo 86
Background Factors and Intelligence 90

Part II Promoting Learning in the Classroom 101

4. Some Views of Learning 103

Some Illustrations 103
Understanding the Nature of Learning 105
Aspects of the More Formal Theories 106
Variety in Theories 106
Theories Stressing Cognitive Givens and Human Attributes 111
Theories Stressing Mechanistic Givens 117
Theories Stressing More Esoteric Givens 119
Computers, Task Analysis, and the Mathematician 123
What To Think About the Rival Views 129

5. Motivation and Practice 135

The Mechanisms of Motivation and Their Management 139
Specific Motives for Classroom Use 145
Activity and Practice 158

6. Maintaining a Schedule of Success 171

Arranging for Reinforcement 173
Arranging for Acceptable Responses 180
Programming and Automation 190
Curtailing Unwanted Behavior 200

7. Structure and Meaning in Learning 211

Making Use of Meaning and Structure 214
Developing Meaningful Relations 229

8. The Higher Uses of Intellect 251

Problem Solving 252
Critical Thinking 267
Creative Thinking 272

9. Effectiveness in Learning 291

Facilitation and Interference in Learning 292
Teaching for Retention 303
The Use of Transfer 312
Rules for Effective Study 328

10. Estimating Aptitude and Success 339

Some Basic Concepts of Measurement 343
Measuring Readiness for Instruction 349
Measuring Achievements: Some General Problems 358
The Broader Effects of Testing 376

11. Diversity in the Classroom: Individuals and Special Groups 387

Types of Differences To Be Recognized 388
Administrative Arrangements 392
Classroom Procedures 399

12. **Character and the Process of Socialization** 417

Theories of Socialization 418
The Detailed Mechanisms of Socialization 428
Development in Specific Aspects of Character 435
Types of Background Factors: Résumé 445

13. **Adolescence: Transition to Socialized Maturity** 457

Adolescent Development: Continuations and Beginnings 460
The Special Issues of School and Career 466
Socialization, Morals, and Citizenship 473

14. **The School in the Process of Socialization** 497

The School and the Mechanism of Socialization 497
Teaching General Attitudes and Beliefs 505
Contending with Social Ills 514
Success, Disappointments, and Hopes 522

15. **The Class as a Social Group** 531

General Relations Between Students 533
Authority and the Pattern of Influence 543
Individual Reaction to Group Forces 551
Leadership in the Classroom 555
Effective Classroom Groups 559
Discipline and the Group Process 561

16. **Mental Health, Effectiveness, and a Sense of Worth** 583

Dealing with Classroom Stresses 597
Promoting Positive Values 605

17. **The Teacher and His Own Adjustment** 615

Satisfaction in Teaching: A Brief Review 616
The Problem of Frustrations 618
Reassurances in Teaching 629

APPENDIX: SOME ELEMENTARY STATISTICS 639

Frequency Distributions 640
Averages and Ranks 641
Measures of Dispersion 644
Measures of Correlation 648
Making Inferences About Larger Groups 658

NAME INDEX 669
SUBJECT INDEX 676

PART I
Teacher and Student

Ford Foundation, photo by Roy Stevens

Then we put more
soil on top of them

1

What Teaching Is Like

Teaching is a complex process, having important facets that might be easily overlooked. Psychologists and sociologists have given much attention to the work the teacher does and to the forces by which he is moved. In this chapter we take a brief look at the more useful results of these studies.

This general introduction touches briefly on a number of topics that receive more detailed treatment in later chapters. Later on, for instance, we see the teacher involved with specific classroom problems, with sensitive community problems such as racial cleavage, with discipline (Chapter 15), with administrative problems (Chapter 11), and with some detailed issues that make for difficulties in our craft (Chapter 17).

The General Concerns of Teachers

There are many extrinsic reasons for going into teaching. It is a living. The hours seem attractive. The work is respectable. It seems a natural way to make use of a college education. Along with these lowly, mercenary considerations, however, there must often be some intrinsic urge that points people toward this kind of work rather than toward other jobs that pay as well and that promise even greater practical advantages.

No two teachers, in all probability, will reveal the same sets of attitudes or concerns. To describe these differences, investigators have tried to discover major categories into which teachers can be sorted or major *dimensions* along which they could be placed. One such dimension that readily comes to mind has to do with the teacher's warm regard for children. This interest in the welfare of children, coupled with a delight in their company, might well be one of the chief forces that lead people to engage in teaching. In showing where a teacher stands on this dimension, we can say much about his whole structure of motives and attitudes toward teaching. How does this teacher feel about children? Is he cold, aloof, perhaps a little fearful? Or does he exude pleasure and affection in their presence? Or, most likely, does he fall somewhere between these two extremes?

To describe teachers in terms of a few basic dimensions is of course to oversimplify. For one thing, a trait such as affectionate regard for children may itself be made up of several subtraits (Yee and Fruchter, 1971). There is always the danger, moreover, of suggesting that such a dimension is a fixed characteristic of the teacher. In actual fact, as we shall see later (Chapter 15), a teacher who shows much regard in dealing with middle-class children may seem to be harsh and rejecting when dealing with children who take less kindly to school.

This dimension of affectionate regard has turned up in studies of the unconscious needs of teachers, in the way that teachers describe their students (Jackson, Silberman, and Wolfson, 1969; Masling and Stern, 1963), and in the observations of classroom behavior (Rosenthal, Underwood, and Martin, 1969; Sears and Hilgard, 1964; Ryans, 1960). It is also revealed in statements of formal beliefs (Wehling and Charters, 1969; Masling and Stern, 1963). For the teacher high in this dimension it is important to be with children, to care for them, and to feel their love, or respect, or regard. When he becomes analytical about his job, this teacher would think that the teaching act begins when he senses the needs of some particular child or children. He then reaches into his own resources to see what he may have to meet those needs.

A second dimension deals with the teacher's view of his work as a form of self-expression. A teacher at one extreme of this dimension would feel quite strongly that he has something important to say. He believes that most people would profit somewhat from his information or his views, and that some people would profit a great deal. For him, the teaching act could begin with this missionary urge to impart the truth. He then looks for suitable groups to whom he could direct his message.

The teacher ranking high in this concern for self-expression may attach great importance to the subject he likes to teach (Wehling and Charters, 1969). He may well be somewhat dominant (Masling and Stern, 1963) and exhibitionistic. He is likely to be conscious of his style as a teacher and may be worried if his performance has lacked elegance, even when this lack may have had no harmful effects on anyone else (Jackson, 1968). Conversely, his view of his own performance may remain relatively intact even though he may feel that he accomplished little in the way of results. In one investigation (Jenkins and Deno, 1969) classes being taught included a preponderance of stooges. For some teachers, these conspirators were told to look eager and to take part in enthusiastic fashion. For other teachers, the stooges were to be apathetic and indifferent. Teachers faced by the apathetic students were clearly convinced that there was little accomplished in that class. It is less certain, however, that they thought they themselves had turned in an inferior performance. This dimension of self-expression, as described in the statements of teachers, probably has much in common with the dimension of liveliness, or surgency versus dullness, which turns up in observer's ratings of classroom performance (Ryans, 1960).

Along with the teacher who is oriented chiefly to the child and his needs, and along with the virtuoso and his concerns about subject matter, we can visualize a third teacher who is oriented largely to the demands of the job itself. He may have only an ordinary regard for pupils, and he may have no great preference for one teaching assignment over another. When he does find himself in a teaching situation, however, he may be keenly aware of the things that must be done. He is strongly oriented to the situation and to its demands. He is realistic and does not try to ignore the many practical problems that must be solved. This dimension is linked with such personality traits as conscientiousness (Davis and Satterly, 1969) and with the inner need for order (Masling and Stern, 1963). It is probably linked with the dimension of "businesslike versus disorderly" derived from classroom observations (Ryans, 1960).

Patterns of Concerns At the extremes, any two of these dimensions would tend to be mutually exclusive. A person who is extreme in his orientation to the needs of children is not likely to be also extremely oriented to his own need to carry his message to all comers. Apart from the extremes, however, the dimensions are somewhat independent (or *orthogonal,* as the factor analysts would say). A person who has a moderate concern for the needs of children could stand either low or high in his need to express himself or in his concern for the practicalities of teaching.

As we might expect, a strong orientation toward the needs of children is more likely to be found in women than in men (Masling and Stern, 1963) and in the teachers of young children rather than in the secondary school (Jones, Gottfried, and Berkowitz, 1967). This latter difference holds for both men and women.

In interviewing 50 teachers regarded as outstanding, Jackson (1968) found a pronounced concern for individual students. These teachers, however, also ap-

Behavior of Students and the Teacher's View of Himself

As part of their course in teacher training, college seniors were required to give a 20-minute lecture on a subject of their choice and to follow this lecture with discussion, or with other exercises, with their pupils. Each student teacher talked to 14 sophomores who acted as pupils or learners. Of these 14, 10 were "stooges" briefed with regard to their behavior. The same 10 stooges served in each of the 20 classes. The other 4 learners were different for each class and knew nothing of the purpose of the experiment.

For half of the student teachers the stooges were told to *show interest* and excitement, take notes, and to nod and smile frequently during the lecture. For the other 10 student teachers the stooges were told to look *bored*, to avoid the teacher's eye, and to avoid taking notes. Following the session, each student teacher filled out a rating sheet. A score of 1 means the most favorable reaction, a score of 3 is average, 5 is least favorable.

	Reaction of the Student Teachers	
Questions Covered by the Rating Sheet	*Students Teaching Bored "Stooges"*	*Students Teaching Interested "Stooges"*
Did you enjoy teaching today?	2.0	1.7*
(Did you do your part?)		
Was your lecture well planned?	2.5	2.1
Was your lecture interesting?	2.8	2.2
Were your concepts well explained?	2.3	3.5
(Effect on Learners)		
Did the students learn much?	4.0	2.7*
Were the students eager to respond?	4.5	2.0*
On the basis of this experience, how effective do you think you would be as a teacher?	2.8	2.2*
Are you effective in holding the students' attention?	3.8	1.6*

The scores marked * are significantly more favorable for the "Interested" classes. The other differences were not significant.

SOURCE: Joseph R. Jenkins and Stanley L. Deno, Influence of student behavior on teacher's self-evaluation, *Journal of Educational Psychology*, 1969, **60**(6), 439–442.

peared to be quite high in the need for individual self-expression. They were exceptionally sensitive to the audience reaction of their pupils, and relished the privilege of doing things their own way and of following their own spontaneous inclinations. They had little use for lesson plans and would be most annoyed if they had to follow a preset curriculum in precise fashion.

In all this discussion we must not be unduly swayed by the sound of the words being used. Words like "warm" and "supportive" have a pleasant sound, whereas any suggestion of "show-off" or "exhibitionism" may turn us off. But we must not assume that the warm teacher is automatically effective and that the show-off is just entertaining himself. As we point out later, there are many ways to be effective. In one investigation (Spaulding, 1964) it was the businesslike instructor and not the supportive teacher who induced the greatest achievement in the majority of the subjects. Some students, moreover, prefer instructional skill to personal warmth.

Becoming a Teacher

The concerns to be found in the experienced teacher are also seen to some extent in those who have just decided on teaching as a career. One young man, for instance, likes to work in the world of books or ideas, or has a strong interest in nature study, and he thinks teaching may be an outlet for this interest. Another thinks he would like to work with children. A third finds himself getting some pleasure out of explaining things to others and he, too, sees teaching as a natural outlet for this drive.

But we must not suggest that it is always some deep inner urge that leads people into teaching. Sometimes they almost automatically follow a family tradition of teaching. Some students are influenced by an admired teacher in life, or in fiction, or by the suggestion of counselors (Stern, 1963). At times the decision is quite prosaic. Unable to think of any other vocation, the student drifts into teaching for the time being and finds that he likes it (Haubrick, 1960). Negativism even plays a part. Thinking of a detested teacher, the student may say, "You don't have to be like that. I'll show you!" (Wright and Sherman, 1963).

Whatever the nature of the call, it sometimes proves transient. Most young people change their vocational plans during their college careers (Marks, 1970). In one large university, for instance, 70 percent of the seniors had changed their vocational plans at least once (Pierson, 1962), and prospective teachers are probably not exempt from this restlessness. Many teachers, moreover, leave the profession after a year or so of experience.

Transition from Student to Teacher As the prospective teacher moves through his period of training, a number of changes occur. During the freshman year, it is the student with somewhat lower academic achievement who is most intensely interested in teaching. By the sophomore or junior year, however, things are the other way around, and the students most oriented to teaching excel their more dubious fellows (Reitz, 1970). Even at the sophomore level, however, teaching is still a distant prospect and often somewhat frightening. A brief experience in teaching at this time may bring about an increased feeling of involvement and may bolster a student's confidence in his ability to teach. This has been particularly effective when the student can see a video-tape of his own performance (Goldman, 1969). Prior to his period of practice teaching, however, the beginning teacher is chiefly a student. His day-by-day thoughts dwell not so much on such detailed practical problems as keeping order, using appropriate methods, or individualizing instructions as on his own problems of getting good grades, maintaining reasonable relations with his fellow students, and getting the required courses out of the way (Fuller, 1969). Later on, he may look back on these student days as a period of delightful irresponsibility in which he had merely to worry, on the one hand, about his own scholastic success and, on the other, about the evils of that alien adult "establishment" which all teachers may seem to represent (Charters, 1963).

On first starting practice teaching, the student may encounter a bit of a shock. What he sees going on in the classroom is often at odds with the idealistic theory he has come to accept (Iannaccone, 1963). He finds himself asked to give up his reliance on the abstractions he has mastered in class and to deal with the complex practicalities of teaching. In a sense he is even asked to abandon his loyalties and to go over to the enemy. Certainly the neatly drawn lines between "us" and "them" become blurred, often after a trying period of indecision. Part of the time, at least, he must be one of "them." At the outset he finds himself extremely critical of the regular teacher to whom he is assigned. ("She actually gave one of the children a shaking!") For a few students, especially for those preparing for secondary school teaching, this critical attitude may persist, and the regular teacher's conservative attitude may lead the student teacher to a position that is even more liberal than the one he held at the outset. Most student teachers, however, come more and more to adopt the views of the regular teacher to whom they are assigned (Yee, 1969). Instead of two people suspicious of each other, if not actually hostile, there appears to be a cooperating pair and, at times, something approaching a feeling of "we." "*We* had trouble with Jimmie and decided to do this." He finds himself adopting practices he had earlier regarded as barbarous. He places less value on the things the textbooks emphasize and finds himself stressing those things that will get the job done and get the lesson completed. Now a procedure is good if it works, whether or not it accords with theory (Fuller, 1969).

During the practice-teaching stage the young teacher is still worried about how well he is doing. Now, however, he wonders how well he is doing as a teacher. Has he maintained control over the class? How does he stand in the eyes of the pupils? Of the cooperating classroom teacher? Of the supervisor from the training center?

The third stage comes after a few months of actual teaching. The practical emphasis becomes more prominent, and the fine points of educational theory become blurred and sink into the background (Jackson, 1968). Attitudes may become more teacher-centered and less child-centered. The teacher is now less likely to blame the school for all the inadequacies he finds in the child. He is more tolerant of the teacher who demands order and accomplishment. He is less insistent on honoring the rights and needs of children (Charters, 1963; Masling and Stern, 1963). Occasionally he may actually be disturbed by his own inability to sympathize with the interests and values of his adolescent charges (Smith, H. P., 1950).

At the same time that he comes to feel less urgent regard for the theoretical rights of children in general, the teacher may begin to show even more intense concern about the problems of individual pupils. He feels more impelled to understand Sue and George, to estimate their abilities, and to avoid adding to the problems with which they must now contend (Fuller, 1969; Jackson, 1968).

Roles and Responsibilities

A teacher in his work plays many parts. Inevitably, some of these are rewarding and others irksome. For many a teacher, for instance, the chance to express himself—to enjoy his autonomy—is greatly prized (Jackson, 1968). Cafeteria duty may seem demeaning and frustrating. The teacher may resent the fact that he is almost a prisoner of his role. Like the policeman or the postman, lost in the uniform of a well-established role, he may feel he is not regarded as George Jones, with all his aspirations and despairs, but merely as a functionary.

Psychologists and sociologists have studied many of the roles that a teacher may fill (Grambs, 1965; Charters, 1963; Wallen, 1963). To the child he is a general representative of the adult world. To his superiors and to some students he is a specialized director of learning (see Chapter 4). To the community that supports him but may not quite accept him, he is a symbol of cultural values and, to a lesser extent, a symbol of morality. In his own mind he may be all of these things and also a friend and confidant of youth, and a member of a worthy but inadequately recognized profession.

Supplementing the Work of Parents Parents are often unable or reluctant to do everything they think should be done for their children. They cannot always get away when the child must venture forth. They lack the specialized knowledge necessary for training in some areas. For other areas they may have the competence but lack the sustained interest necessary to induce a mastery of spelling, multiplication, or ancient history.

Young children see the teacher as this adult serving as a parent substitute. The teacher is an adult with whom they must spend much time and who has the power of making life cheerful or miserable, according to the mysterious and arbitrary currents by which adults are moved. He can offer emotional support or can act as a threat. The summaries of investigations (Allen, 1960; Witty, 1955) over a period of thirty years (Taylor, 1962; Foster, 1933) tell a fairly consistent story. Children in the early grades describe the teacher they like as kind, patient, cheerful, friendly, humorous. The teachers they dislike are simply cross, cranky, crabby, and bossy. Young pupils say little about the teacher as an instructor or a clarifier of intellectual mysteries. Specific pedagogical practices

Impressive Teaching Takes Many Forms

Love, Support and the Door to Insight. Helen Keller describes her teacher, Anne Mansfield Sullivan:

> I felt approaching footsteps. I stretched out my hand as I supposed to my mother. Some one took it, and I was caught up and held close in the arms of her who had come to reveal all things to me, and more than all things else, to love me.
>
> We walked down the path to the well house, attracted by the fragrance of the honeysuckle with which it was covered. Some one was drawing water and my teacher placed my hand under the spout. As the cool stream gushed over one hand she spelled into the other the word *water*, first slowly, then rapidly. I stood still, my whole attention fixed upon the motions of her fingers. Suddenly I felt a misty consciousness as of something forgotten—a thrill of returning thought; and somehow the mystery of language was revealed to me.

Teaching Intermingled with Family Living. John Stuart Mill is describing his education at the hands of his brilliant father, James Mill.

> I went through the whole process of preparing my Greek lessons in the same room and at the same table at which he was writing; and as in those days Greek and English lexicons were not, and I could make no more use of a Greek and Latin lexicon than could be made without having yet begun to learn Latin, I was forced to have recourse to him for the meaning of every word which I did not know. This incessant interruption, he, one of the most impatient of men, submitted to, and wrote under that interruption several volumes of his *History* and all else that he had to write during those years.
>
> But the lessons were only a part of the daily instruction I received. Much of it consisted in the books I read by myself, and my father's discourses to me, chiefly during our walks. From 1810 to the end of 1813 we were living in Newington Green, then an almost rustic neighborhood. My father's health required considerable and constant exercise, and he walked habitually before breakfast, generally in the green lanes toward Hornsey. In these walks I always accompanied him, and with my earliest recollections of green fields and wild flowers is mingled that of the account I gave him daily of what I had read the day before. To the best of my remembrance, this was a voluntary rather than a prescribed exercise. I made notes on slips of paper while reading, and from these in the morning walks, I told the story to him.
>
> In my eighth year I commenced learning Latin, in conjunction with a younger sister, to whom I taught it as I went on, and who afterward repeated the lessons to my father: and from this time, other sisters and brothers being successively added as pupils, a considerable part of my

> day's work consisted of this preparatory teaching. It was a part which I greatly disliked; the more so, as I was held responsible for the lessons of my pupils, in almost as full a sense as for my own: I, however, derived from this discipline the great advantage of learning more thoroughly and retaining more lastingly the things which I was set to teach: perhaps too, the practice it afforded in explaining difficulties to others, may even at that age have been useful.

The Stern Teacher with a Powerful Sense of Duty. Louis Henri Sullivan, the revered mentor of Frank Lloyd Wright, reports on the welcome to new students accorded by Moses Woolson (1821–1896).

> He was tense, and did not swagger—a man of passion. He said, in substance: "Boys, you don't know me, but you soon will. The discipline here will be rigid. You have come here to learn and I'll see that you do. I will not only do my share but I will make you do yours. You are here under my care; no other man shall interfere with you. I rule here—I am master here—as you will soon discover. You are here as wards in my charge; I accept that charge as sacred; I accept the responsibility involved as a high, exacting duty I owe to myself and equally to you. I will give to you all that I have; you shall give to me all that you have. But mark you: The first rule of discipline shall be SILENCE."

There may have been teachers and teachers, but for Louis Sullivan there was and could be only one.

SOURCES: Helen Keller, *The Story of My Life* (New York: Doubleday & Company, Inc., 1902); *Great Teachers*, ed. Houston Peterson (New York: Vintage Books, Random House, Inc., n.d.); Louis Henri Sullivan, *The Autobiography of an Idea* (New York: Dover Publications, Inc., 1924).

are seldom listed, though there is some mention of favoritism or fairness in discipline. Skill in teaching is more likely to be stressed in the upper grades, although even here the menace of the cross, crabby teacher never quite recedes.

In supplementing the work of parents, as we have suggested, teachers not only do things that parents cannot do but also things they do not choose to do. Grandparents in some aboriginal cultures (Mead, 1951) serve a similar function. Here the parents could quite adequately transmit the tribal legends and stress the ceremonial duties. But grandparents can also do this, and can do little else, and having little else to do, they may as well take over this chore. Similarly teachers, since they have the child anyway, may just as well teach him local politics, automobile driving, drug avoidance, and other things that parents may be competent to do their own.

Specialized Director of Learning Within the profession, and in the minds of some students, the teacher is the expert who directs the process of learning

(Woodruff, 1962; Smith, B. O., 1960). Success in this role has been most gratifying to many teachers. In appreciative accounts we learn of the teacher's rich satisfaction in bringing to light, and to a functioning level, some talent that the student himself had neither much noticed nor greatly valued. The teacher also finds great satisfaction in seeing comprehension and appreciation develop in those who have listened to his explanations and have wrestled with his demands.

In their thoughts about teachers they knew, older students pay some attention to the teacher as a manager of instruction. It is true that the image of the teacher as a parent or authority figure, so all-pervasive with young children, persists even into college days (Ofchus and Gnagey, 1963). Certainly older students agree with younger students in describing the detested teacher as cross and cranky, adding such items as sarcastic and bossy (Tiedeman, 1942). When describing the teacher they like, however, older students frequently stress the didactic arts (Isaacson, McKeachie, and Milholland, 1963). They speak of skill and patience in explaining, of the amount of work assigned, and of the intensity and consistency of the academic demands. There is some possibility, by the way, that this view of the teacher as director of learning may be more prominent among English students than among students in the United States (Taylor, 1962). At the college level, moreover, it seems to be lower-class students who regard the teacher primarily as one responsible for inducing learning. This is the job they think the college teacher is paid to do and, in the minds of many such students, it is a job that the typical college teacher performs in rather indifferent fashion (Rees, 1969).

Symbol of Cultural Values Along with other roles, the teacher has undoubtedly served as a representative of cultural things. Like the pastor, he served to remind people of things they acknowledged to be important but which, all too often, they tended to neglect. Merely seeing him around, or seeing the late lamp burning in his study, people would remember that there is a world of books and ideas and would think of other values so easily ignored.

In some views of schooling (Stephens, 1967; Entwisle, 1961), this symbolic function of the school receives great stress. The mere presence of a highly visible person, or of a building or an institution, standing for culture, may lead people to pay more attention to the intellectual things they encounter in their ordinary life. To attain this visibility, the teacher's own culture would have to be geared to the community. In one community, or at any one time, a very ordinary education might mark one as distinctive in the world of the mind. In other communities, or at other times, only an exceptional mastery of cultural matters would establish the teacher as a conspicuous symbol of scholarship.

In many communities thoughtful adults may think of the teacher largely as this symbol of culture. In judging the teacher, the adult may ask, How does this person fit my concept of an educated man? Do I feel happy about him as a representative of the intellectual things I know about, or would like to know

8679

College Students' Views of Teachers in General

Sixty-five undergraduates in a western college gave their opinions of college teachers in general, and also answered a questionnaire about themselves. A factor analysis revealed certain discreet clusters of individuals who seemed to be distinguishable from the general group of students.

Descriptions of Students Within Certain Clusters	*Opinion about College Teachers in General*
1. Students from stable lower-class homes	College teachers lacking in skill
2. American Indian students having difficulty with science courses	Teachers are skillful, friendly, and well organized
3. Intelligent, sophisticated well-traveled male	Sees college teachers as lacking personal "structure"

SOURCE: Richard D. Rees, Dimensions of students' points of view in rating college teachers, *Journal of Educational Psychology*, 1969, **60**(6), 476–482.

about? Or do I feel a little sad when I think of this person as a symbol of the world of ideas?

Symbol of Morality and Character In many cultures the teacher, if not himself a priest, is often brother or cousin to the priest and is expected to foster those aspects of character or morality that are easily ignored in the hurly-burly of living. Western writers (Charters, 1963; Havighurst and Neugarten, 1962; Warner, Meeker, and Eels, 1960), particularly, have stressed the teacher's role as a purveyor of middle-class morality or middle-class values. They take it for granted that the teacher is called upon to transmit the moral values that the middle-class citizens of any given era happen to hold. Whenever the middle class has held to the so-called Protestant or Puritan ethic, for instance, the schools have stressed work, ambition, success, independence, dependability, and prudent preparation for the future. Now that middle-class society may be worshiping the new god of sociability, togetherness, conformity, and groupthinking, the school's recent emphasis on sharing and group relations would seem a natural consequence.

In stressing the type of character necessary for success, whether that be sturdy independence or convivial conformity, the teacher takes over a role often retained by parents themselves in primitive societies (Mead, 1951).

There has been some question, by the way (Charters, 1963), that the school's emphasis on middle-class morality necessarily represents docile compliance. It may be that the values of dependability, respect for order, and similar values attributed to the middle class are necessary for the smooth functioning of any organization such as the school. Even if school people happened to feel primary loyalty to lower-class values—to spontaneity and gratification of impulse—they might well stress order and respect for authority in the school, merely to make it possible to operate in moderate efficiency and comfort. In contrast to the cliché that teachers reward middle-class students and punish lower-class students, there is now some evidence that teachers reward any behavior that fits in with school values, whether the child comes from one side of the tracks or the other (Hoehn, 1954).

Gilbert Highet (1950) has made much of the dramatic success and dramatic failures of the great historic teachers in developing the moral character of their students. He is impressed by the remarkable success of Alexander, the pupil of Aristotle, and with the sorry performance of Judas, the pupil of Jesus, and of Nero, the pupil of Seneca. Even with such great teachers, the teaching of morality has proved to be a precarious enterprise. Indeed, Highet has implied that the enterprise is even more hazardous for the truly great man. He casts a tremendous shadow. To emerge from this shadow, the pupil may be driven to desperate, and perhaps vicious, expedients.

Member of a Profession There has been some doubt about whether or not teaching really is a profession (Yee, 1972; Anderson, 1962; Havighurst and Neugarten, 1962; Lieberman, 1956). The problem of dealing with this question is discussed in Chapter 17. There is no doubt, however, that the teacher is a member of a definite vocational group. In his role as a member of a group of school people, or of a school organization, the teacher has definite duties, rights, and sources of contact. He talks regularly with principal, department head, or supervisor. From each of these he can expect certain things. To each of these he has some obligations. He also has many contacts, both formal and informal, with colleagues of the same rank. In these contacts there may be much satisfaction and also many occasions of distress. To some teachers these contacts mean a great deal. Often we get the picture of a coherent band of warriors in common cause against the perils of their craft, whether these be merely the inevitable difficulties of teaching, the shortages of equipment, or even the perversity of administrators (Bowen, 1960).

Since the public may regard him as a representative of a profession, the teacher may feel a corresponding obligation not to let the profession down. People in general assume that the teacher is one who is well versed in the scientific background of his craft. If they find a few teachers lacking in this background, they may feel less confidence, not only in the particular individuals involved, but in the profession as a whole.

Member of the Community The teacher must play some role in his community. One of his many functions, indeed, may be to act as a link or interpreter

Teacher Qualities That Impress Students

For the year 1959–1960, at a large state university, 16 graduate students were assigned to teach introductory psychology. In 1960–1961 a new group was similarly assigned. In each year these beginning instructors spent the first semester leading discussion sections that were part of a large lecture class. During the second semester each of these instructors took complete charge of a class.

These graduate students had spent some time together and for any one year it was possible to get each of the 16 to rate the other 15 on a number of traits. From a factor analysis it appeared that these traits could be grouped under such categories as appearing to be a cultured person, agreeableness, surgency or enthusiasm, and dependability. Other data were also available from personality inventories taken by the instructors.

At the end of each semester each instructor was rated by his students. There are thus four "runs," two ratings each for two groups of instructors.

The Characteristics of the Instructor as They Correlate with Students' Opinion of His Effectiveness

Characteristics of Instructor	*Average Correlation*[a] *for Four "Runs"*	*Number of the Four Correlations Significant at 5 percent Level*
General Culture (Peer Rating)	.60	3
Student Rating of Instructor Culture	.48	—
Agreeableness (Peer Rating)	.44	3
Surgency (Peer Rating)	.51	2
Dependability (Peer Rating)	.14	0
Conscientiousness (Personality Inventory)	−.39	0

[a] See the Appendix, pp. 648–658, for an explanation of correlation.

Most of the ratings are based on the general impression of the instructor's peers. A student rating for culture is also included, and one measure of dependability or conscientiousness from a personality inventory. Dependability, no matter how measured, seemed to have little relation—perhaps an inverse relation—to the students' estimates of effectiveness.

SOURCE: R. L. Isaacson, W. J. McKeachie, and J. E. Milholland, Correlation of teacher personality variables and student ratings, *Journal of Educational Psychology*, 1963, 54, 110–117.

between the school world and the general community. In many respects the teacher occupies the role of the stranger or the resident alien within the community. He is in the community but not quite of it. Literally, it is true, he is something of a transient. He is a transient in the profession. Fully 25 percent of teachers have had less than four years' experience (Charters, 1963). He is a transient even within his profession in that he is likely to turn up after hours or on Saturday, moonlighting in a second job. He is a transient in the community. Very frequently he moves to similar jobs in other areas. Whatever the important aspect of his transiency, he is often treated as some rootless person, a person on the move psychologically if not geographically.

Reacting to the Diversity of Roles

In being so many different things to so many different people, the teacher faces many problems. Even the same person may expect different things from him at different times. A parent, acting as a member of the community, may think of the teacher as one who holds up academic standards and turns out an employable product. In thinking of the problem of his own child, however, the same parent may view the teacher as a solicitous friend of youth whose chief function is to smooth the troubled path of his pupils.

In spite of the number of roles to be carried out, middle-class pupils often see the teacher as a single, integrated person who happens to be expressing himself in different ways. To them, the teacher's responsibilities to maintain discipline, to demonstrate affection, and to clarify ideas are all of a piece and are typical of the teacher as a person. Lower-class pupils, on the other hand, tend to see the teacher playing quite separate roles. In the same way, the minister, in their eyes, may seem to be quite a different person when he takes off his clerical robes and goes hunting with the boys. The teacher may seem to be one person when, in his official capacity, he administers discipline, and another person when he permits himself a display of affection (Yee and Runkel, 1969).

The teacher himself must vacillate in his view of his basic function. Many of the roles he may find himself playing are in conflict with one another. No one person can consistently fill them all. It is not unusual to hear the anguished wail, "Just what kind of person am I supposed to be? What is expected of me?" Certainly to many teachers this has been a depressing problem.

But this wide diversity of roles is not a complete evil. Since no one can expect to be especially competent in each and every role, the wise teacher can select the role in which he has most chance for satisfaction and for effective service. To look at the diversity of roles is merely to remind oneself that there are many ways of being a successful teacher.

The Teacher at Work

Whatever the public may think, the teacher's work is by no means confined to the classroom. In Table 1.1 we note that the typical teacher in the elementary school spends about two-fifths of his 50-hour week outside the classroom. For his colleague in the secondary school, the figure is about half of the somewhat shorter workweek. Much of this time outside the classroom is spent in preparing for instruction or in doing things closely related to it. This work consists of correcting papers or marking tests, making out report cards, preparing material of instruction such as charts or displays, preparing work sheets and things needed for demonstrations. All told, this amounts to about 1½ hours each day or 7½ hours per week. The average teacher spends another 2½ hours per week in reviewing the subjects he teaches or looking up details that he should know before going into class. About an hour each week is spent in giving help to individual students after class, and about the same amount of time in consulting with parents about the pupil's schoolwork.

TABLE 1.1 ✓**Hours Spent Each Week in Different Activities**

	Elementary School Teachers	*Secondary School Teachers*
Classroom instruction	30	24
Other work directly related to instruction	12	13
Work not directly related to instruction	7	9
Total	49	46

SOURCE: *Teaching Career Fact Book* (Washington, D.C.: National Education Association, 1963).

Not all the time outside the classroom is taken up with instructional matters. The typical teacher will spend from 1½ to 2 hours per day in incidental or miscellaneous duties that have little to do with his regular classroom responsibilities. The biggest item in this category is the chore of supervising playground, study hall, cafeteria, corridors, and bus loading or unloading. About 2 hours a week go into record keeping and reports; one class period per week is devoted to official meetings. Especially at the secondary school level, some time each week will be spent with various clubs or with helping in athletics or extracurricular activities or projects.

In a number of schools many of the noninstructional duties are taken over by teachers' aides (Thomson, 1963). These aides take attendance, keep other records, and take care of mimeographing. They also correct objective tests, look after films that must be located and returned, and run movie projectors. In some cases they help in preparing materials for display, and even coach children who have been absent for a few days.

Classroom Activities Whatever his feelings about the matter, the teacher should expect to find himself in the center of the classroom stage. Some teachers accept this fact as natural and wholesome. Others reject the idea, holding that they should merely be one member of a democratic group—a more experienced member—but still just one member. When, however, the cold eye of the camera is turned on the scene (Adams and Biddle, 1970), or when an observer carefully notes what he sees (Jackson, 1968), the teacher almost always turns out to be the prominent member of the group. He is at least half the dialogue. When he talks, he talks to the group. When a student talks, he talks to the teacher. The teacher is seldom just one member of the audience.

At almost all levels of instruction, the lion's share of the classroom time goes to the dissemination of information about subject matter. The teacher may provide the information, direct students to sources, or comment on the adequacy of the information proffered. An additional 20 percent of the time is spent in examining the information, analyzing it, and evaluating it (Adams and Biddle, 1970).

Earlier studies by Flanders (1965) had also found that most of the time is given over to the dissemination of the information, and during this time the teacher is most likely to supply this information in fairly direct fashion. Flanders, however, makes a great distinction between teacher talk which shows direct influence (lecturing, giving directions, and showing a student where he is wrong) and that which shows an indirect influence (accepting student feelings, praising, accepting student ideas, or asking questions). The relation of these activities to classroom performance is discussed in Chapter 15.

In addition to instructing pupils and putting them at their ease, the teacher must spend much time in just keeping things going. He makes sure that students have their pencils and the appropriate books. He keeps some kind of order and deals with the minor emergencies of the moment (Stinnet and Haskew, 1962).

Still other goals or objectives are apparent as the teacher tries to get pupils to react more adequately to each other and takes steps to improve the group relations. At times he encourages a diffident child to speak out or persuades a more vigorous participant to wait his turn. Along with his ordinary instruction he helps the group to grasp the full force of some member's contribution.

Again, intermingled with his academic activities and his duties as discussion leader, he introduces a modicum of warm emotional regard (Flanders, 1965; Hughes and others, 1959). This may range from a friendly arm across the shoulder to a fleeting smile of appreciation, a brief word of praise, or a chuckle at a well-turned jest. At a more formal level it may consist of a few statements indicating an appreciative feeling for some or all of the students. The activities of most teachers will also include some sharp disapproval or an emotionally toned reprimand.

Our list would be incomplete if we did not make room for sheer self-expression on the part of the teacher. On many occasions the teacher indicates his opinions, or asserts his views, or recounts his experiences, even when these may have no clear-cut bearing on the academic objectives of the lesson. Typically, of course, many of the opinions or incidents mentioned by the teacher will have a bearing on the lesson. But often they seem to be purely spontaneous utterances.

In view of the multiplicity of things done by the teacher, it is not surprising that some specialization has taken place. In many schools you may see a team of teachers (see Chapter 11). One member of the team may deliver a lecture while other members pass among the desks to help pupils follow what is being said. Another member may conduct a brief demonstration for small groups of students or provide remedial instruction. At times each member of the team may work with small discussion groups (Shaplin and Olds, 1964; Lambert, 1963).

Concerns and Styles In watching the teacher carrying out his responsibilities, we can see how the different basic concerns come to the fore. In the classroom of some teachers we will be impressed by the kindly, interested adult, friend and companion of youth, who takes a warm and friendly interest in pupils. He tends to be more interested in students than in the subject he teaches, regarding the latter chiefly as a means of helping the student to develop. He may get his chief pleasure from his interaction with the individual student. Or, like the fond parent warming to the spectacle of two children at play, he may get most of his satisfaction from the relations that develop between students.

The teacher who cares deeply and intensely about each student may not always express himself in affectionate or friendly terms. In the minds of adults safely removed from his clutches, the caustic critic or classroom tyrant may be remembered as having an intense concern for the welfare of his students. Certainly the more highly regarded of these critics used their biting remarks to provoke the student to a more careful analysis and to a more complete mastery of the subject. Perhaps they used their jibes skillfully. But however laudatory the goal, they exhibited little humanity or ordinary friendliness in the process. Other intensive questioners, however, stand high on the scale of kindliness. Socrates was noted for his patience and good nature. Indeed, in the written record, he seems to do his most effective work when, with equable temper and unfailing courtesy, he rides the storm of the student's antagonism and leads him to a rational decision.

In other classrooms we may be impressed by the teacher as a *businesslike director of instruction*. This teacher is orderly and efficient. Every problem has been foreseen and provided for, and the lesson proceeds with clockwork precision. We do not know what this teacher thinks about his students as people, but we do know that he takes a serious attitude toward the process of instruction.

In this manner, such a teacher may be vivid or quiet. Even the mousy teacher, however, can often hold an older group if he is sufficiently skillful in the business of instruction. He may never utter a single wasted word, and may speak in icy, businesslike fashion, directing his remarks to the ceiling, and yet may hold his students by the logic with which he marshals and presents his ideas.

In watching still other teachers, we are struck with the qualities of liveliness, surgency, or force. This is the teacher who comes alive in the classroom, who is expansive, stimulating, perhaps somewhat exhibitionistic. We know that this teacher enjoys his own performance, but we can be sure of little else. Underneath his lively presentation there may be a clear plan and a compact system, or there may be chaos and confusion. We know nothing of his attitude toward the students. He may be deeply concerned about each and every one as an individual, or he may regard each as an anonymous member of a mass audience that merely facilitates his act. We cannot tell whether the subject of instruction is important to him or whether it is merely something he can make use of in his performance.

In the more articulate descriptions of notable teachers at the college level (Highet, 1950), we hear of the eloquent, personable teacher, reaching into all fields of knowledge for the illustrations that enliven and clarify his discussions. Sometimes he is disorganized, sometimes on the trail of some intriguing digression he forgets what he was trying to illustrate, sometimes he is inaccurate. But always he is vivid, human, and interesting, and his students remember him as a great teacher.

Matching Teacher and Child

Different teachers feel different concerns, and their classroom styles reflect the concerns they feel. Different pupils have different needs and aversions, and different tolerances for the things they dislike. Why not try to assign pupils to teachers who meet their needs? There is some evidence (Henjum, 1969) that junior high school students express themselves more freely and more productively when their teacher is a person with whom they feel a close relationship. At the grade twelve level, moreover, Tuckman (1969) found that nonauthoritarian students expressed more satisfaction in the classroom of nondirective teachers. But the evidence is mixed. Tuckman also found that for students preferring an authoritarian approach, the attitude of the teacher made little difference. In an investigation using college classes (Hall, 1970), the match between teacher and student proved relatively unimportant. Some teachers got better results than others, but the superior results of these teachers held for students in general.

Under present administrative conditions, it would seem almost ridiculous to try to make sure that each of the thirty students in a class had a teacher who precisely matched his needs. If the evidence justified it, however, much might be done to match teachers to the different general needs of whole groups of pupils. Some teachers, for instance, might do better with younger than older pupils, with boys rather than with girls, with ghetto children rather than with children from the suburbs.

Age, certainly, seems to be a factor. The kind of teaching that is appreciated by older students may leave the younger child bewildered and frustrated

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Matching Teacher Behavior and Student Needs: Effects on Learning

College students in 22 different classes rated the instructor on 7 traits, such as willingness to consider student views, willingness to grant autonomy to students, demandingness, and personal support. Each instructor rated himself on these same 7 traits. The instructor's actual standing on each of these traits was a combination of his own rating and the rating of his students. The students also turned in similar ratings of an "ideal" instructor. From this it was possible to get a measure of the agreement between the instructor's actual standing in the traits and the standing of an instructor the students would prefer.

The final grades showed little relation to the instructor's standing on the 7 traits. The correlations (see Appendix, pp. 648–658) clustered around a median of 0.11. But the grades showed no more relation to the agreement between the instructor's style and the style the students preferred (median correlation .03).

Including both grades and the student's ratings of outcomes, there were 7 different measures of success in the course. Comparing each of these measures of success with each of the 7 traits of the instructor, we get 49 correlations. In 26 of these correlations, course success was more clearly related to actual teaching style than to agreement between actual and desired style. In 21 of the correlations the success was more closely related to the agreement between desired and actual teaching style. Two of the comparisons showed no difference.

SOURCE: Douglas T. Hall, The effect of teacher-student congruence upon student learning in college classes, *Journal of Educational Psychology*, 1970, **61**(3), 205–213.

(Evans, 1969). Fortunately there may be some selective factor at work to help achieve an age match. When asked to recall events in their lives, for instance, prospective teachers are most likely to dwell on the ages corresponding to the age range of the classes they expected to teach (O'Neil, 1969).

The very circumstances of teaching, moreover, work toward a rough-and-ready match between the needs of students at various ages and the kinds of teaching they will probably get. With the more mature students at the college level, or in the later years of secondary schools, a teacher who is strong in a single dimension may do useful work. At these levels an able director of instruction may be aloof, or even caustic, and still be very effective. Kitteridge, of Harvard, collected his notes, books, and miscellaneous gear to the rhythm of his closing paragraph and was out of the door before the most enterprising student could catch him. Yet he had a reputation as an outstanding teacher. At these ages, moreover, the student can get much from the surgent, noisy actor who

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ignores many of the practicalities of instruction and who may be careless with his facts, and the data suggest that surgency plays a more vital role with older students (Evans, 1969; Ryans, 1960). At these ages the student is likely to be exposed to a number of teachers during the day and will not be continually handicapped by the same shortcomings. It is at these levels, moreover, that teachers do seem to specialize in one concern or dimension. Knowing that a given high school teacher is friendly rather than aloof, for instance, you simply can't tell whether he is organized or disorderly, whether he is surgent or dull. Knowing that he is lively, you have no clue to his friendliness or to his proficiency with instructional details.

In contrast to his colleagues in secondary school or college, the teacher at the elementary school level is less likely to succeed through strength on a single dimension. No matter how outstanding he may be in vividness and in systematic organization, he cannot afford to be deficient in friendliness or moderate concern for individual pupils. Even in the junior high school, this matter of personal warmth is crucial (Henjum, 1969). Ordinarily, moreover, these younger students do not encounter a wide variety of teachers during the day, and the deficiencies of one teacher are less likely to be corrected by the strengths of another.

It is fortunate, indeed, that the level at which specialization would be disastrous is also the level at which it is less likely to occur. Teachers of younger children are not so likely to "specialize" in one single dimension of successful teaching. A teacher strong in one dimension (say, friendliness) is also likely to be somewhat above average in the other dimensions (liveliness, or conscientious attention to details).

A rough-and-ready matching between teacher and child may come about automatically from the fact that the teacher's interests and inclinations—perhaps even his limitations—may tend to direct him to the age level where he can do the most good or least harm. Through wise counseling in the school personnel office this very general matching might be improved. Similarly, when the necessary facts become better known, it might be possible to match, in a general way, the strengths and interests of the teacher with the known needs and tolerances of other general groups, such as boys or girls, or urban versus suburban children.

Atypical Features of College Teaching

Unfortunately the prospective teacher is exposed to forms of teaching that are far different from the activities he may be expected to carry on. In the teaching that is seen at the college level, the demands of subject matter come to dominate more and more. The college teacher may well feel the need to spend considerable time in doing research that will contribute to the knowledge in his field. At the very least, he must spend long hours in merely trying to keep up with the information produced by others. The psychologist, for instance, must decide on what to do about the twenty thousand books or articles that are offered for his attention each year. Instructors in other subjects may be confronted by a flood much more extensive. The college teacher must decide which of these bits of information to analyze carefully, which to read, which to glance at, and which to ignore. He must then decide how much of this should be brought to the attention of his students, and how it should be organized. Even if he does not do all this selecting and organizing himself, he must know his subject so well that he can intelligently examine and judge what someone else has done.

For the college teacher himself, it is fortunate that these tremendous demands of the subject matter are made more manageable by the reduction of other requirements of the teaching task. When the subject matter requirements are clearly set forth and the materials made available, mature students, able to make independent use of library and text, can do much by themselves and do not have to be led by the hand through each phase of the work.

The obligations that assail the college teacher, and the compensating freedoms he enjoys, do not hold for the lower grades. In view of the great differences in the tasks confronting teachers of different age groups, you might be wise, in forming many of your views of the problems and tasks of teaching, to turn your back on the teaching you now observe at the college level and depend, rather, on your recollections of the teaching you experienced in high school and in the elementary grades. You should not necessarily regard these remembered incidents as models or as ideal procedures, but they should tell you about problems you will face. The tasks that present themselves to your college instructor, on the other hand, differ widely from those that you will face as a teacher in elementary or secondary school.

Various Routes to Success

Despite the differences to be seen at different levels, we can find at each level many ways of being a good teacher, and we can take courage in remembering that good teachers vary tremendously among themselves (Jackson, 1962). The elementary teacher, although unable to ignore his role as a supportive adult, can find many different ways of being friendly and many different ways of offering adult support.

In the upper grades there are even more ways to be a successful and valuable teacher. Good administrators everywhere tend to welcome the wholesome diversity that can come when different teachers emphasize different facets of the profession (Stinnett and Haskew, 1962). Realizing that each student will come in contact with several different teachers, the principal of today is proud of the fact that most pupils will encounter the teacher in many roles: the kindly companion, the stern, uncompromising proponent of some subject, the skilled director of learning, and the excited, surgent purveyor of one subject or another.

Summary

People go into teaching for many reasons—tradition, ideals, an intrinsic fondness for the work. The intrinsic attractions and concerns also vary. For one teacher it is the desire to be with young people and to help them out. This desire is likely to be pronounced in women and in teachers of young children. For another teacher the great thing is the excitement over some subject of instruction, accompanied by the need to pass his enthusiasm along to others, and to do so in an artistic fashion. A third teacher may be oriented to the job that has to be done.

The motivation and orientation of the student teacher change during his training, and especially during the anxious period of practice teaching. Typically the student teacher becomes more practical, more impatient with sheer theory, although no less interested in individual children.

In his broader work the teacher stands as a representative of the adult world and of the general world of culture. Young pupils see him chiefly as the former. Older students see him also as a symbol of the intellect and as a director of instruction. To the teacher himself this is often a cherished role. To a certain extent the teacher may serve as a baby-sitter who takes the children off the mother's hands. In all this he must act as a reasonable representative of morality, must find his place in the community and in his profession, and must try to retain his individuality.

Within the school there are many tasks, some of them going beyond classroom obligations. In the classroom itself the teacher lives a varied and exacting life in which he provides stimulation, support, and an insistence on academic attainment. So many jobs are his, in fact, that teams are often organized to provide specialists for the various chores.

In carrying out his many classroom duties a teacher can bring to his work a diversity of styles. Each teacher can be rated on a dimension ranging from *friendly* to *aloof*; on a second dimension ranging from *businesslike* to *disorderly*; and on a third dimension ranging from *lively* to *dull.*

In view of this variety of teaching styles, each useful in one way or another, there has been much talk of matching the style of the teacher with the needs of pupils at different ages and different needs. For the teacher of young children there must be something in the way of friendliness. At more advanced levels, notable teaching may be achieved by exceptional standing in any one of the dimensions. Among college teachers, of course, mastery of subject matter cannot be neglected. College teaching, by the way, may prove a misleading reference point for the student preparing to teach at a lower level. The teacher at any level should take advantage of the fact that the schools will welcome a great diversity in teachers.

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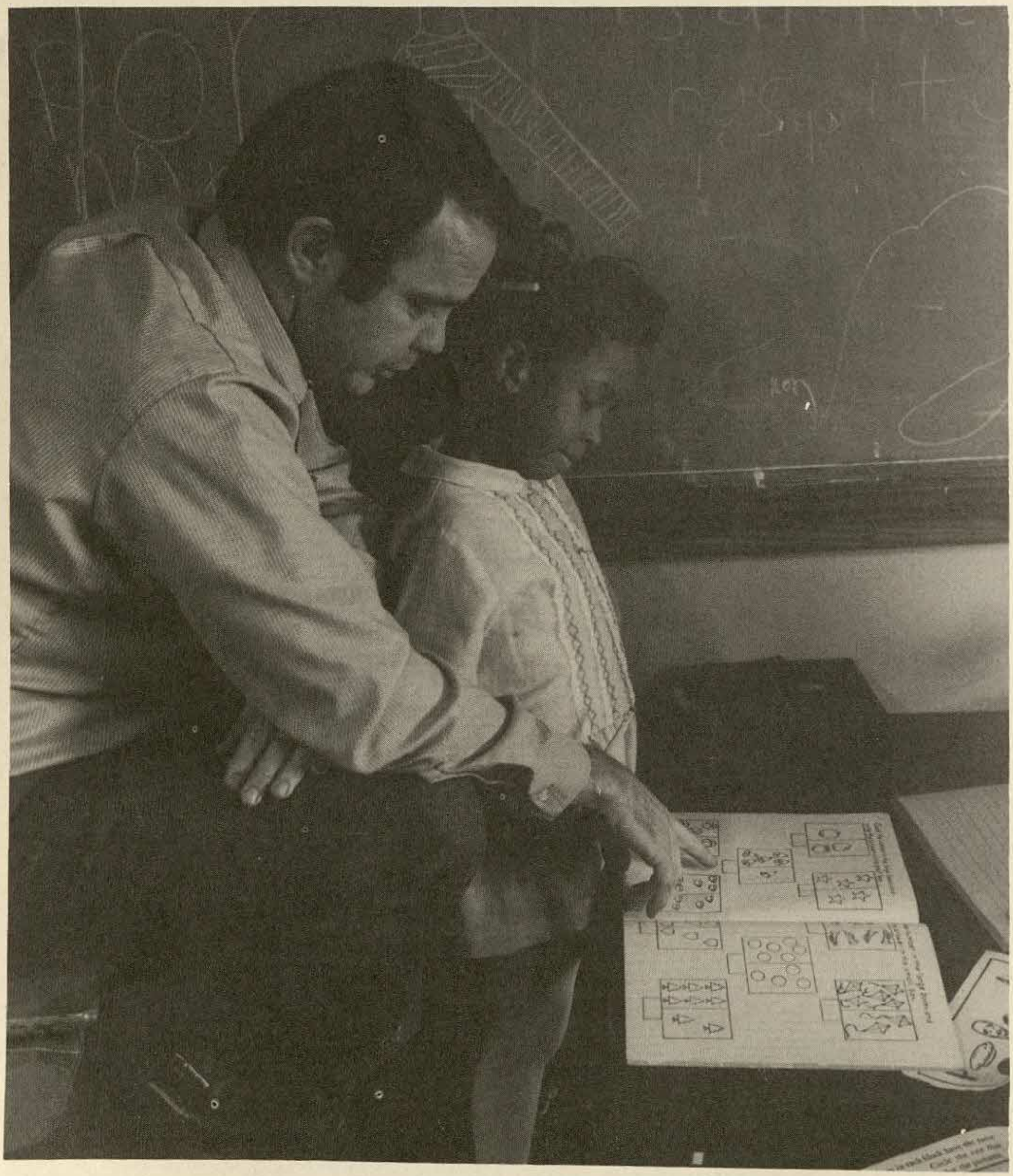
Suzanne Szasz



2

General Child Development and the Use of Language

In many respects, development is a unitary thing and ideally it should be considered in this fashion. It is difficult, however, to consider everything at once; hence, to fit into the larger organization of this book, development is treated in two different sections. At this point, just prior to the discussion of academic growth in the classroom (Part II), we consider the general nature of development and the special areas of linguistic and intellectual growth. Physical development is dealt with largely as an illustration of general development. The development of character, social competence, and mental health is treated later (Part III) when we turn to the teacher's responsibilities in these important areas.

From this division of treatments it will be seen that child development is presented as an aid to the understanding of classroom learning. Such classroom learning is, of course, clearly linked to the child's state of development. What the child can learn, what he probably will learn, and how he will learn it, all depend on the stage of development that has been attained. From the very first years in school, the teacher builds upon the astounding development that has taken place in the preschool years. After enrollment in the school, moreover, the forces that have shaped the child's development so far continue their work. Glands and internal chemistry still produce their powerful effects. Interaction with parents continues with tremendous intensity. Friends and classmates increase in their influence, interacting with the teacher's efforts in all areas, completely dwarfing them in some.

Methods of Studying Child Development

Child development is the study of those changes in the child—in his makeup or in his ways of behaving—which characterize the process of growing older. This development is studied in many different ways (Mussen, 1960). There are a number of reports in which a very few children, perhaps only one, have been studied very intensively (*intensive case study*). Typically such a study will cover many facets of the child—his physique, health, energy, ability, personality, and so forth. Other studies concentrate on only a few facets, perhaps only one (independence, or popularity, or intelligence) but secure the information for a large number of children (*limited variables*). Similarly, in studying the changes in the child as he grows older, we can follow a given group of children through a period of years, observing the same children year after year (*longitudinal method*). We can, on the other hand, study a large number of different children at each age (*cross-sectional method*). Here we assume that this particular group of four-year-olds will reflect the behavior we can expect from our crop of three-year-olds when they become a year older.

Each of these approaches has its values and its limitations. There are obvious advantages, for instance, in the intensive study of a few people. In studying many facets as they operate in these people, we can see changes in some of these facets in relation to changes in other areas. But the results may not hold for the general run of children. There are obvious risks in the cross-sectional method. Our particular group of (say) twelve-year-olds may be drawn from a completely different population than (say) our group of four-year-olds. The introduction of an electronics plant in the locality, for instance, may have led to the influx of many young engineers, scientists, and technical workers having families, for the most part, in the preschool or kindergarten ages. The twelve-year-olds, on the other hand, may be largely the children of older residents with an agricultural background. The twelve-year-olds, therefore, are not only some years older, but they come from a different background, perhaps from a different ancestry. The longitudinal approach avoids this danger, but even this approach is not without its difficulties. In addition to being expensive and burdensome, this method does not protect us from the danger that the particular children studied will not be representative. Typically we use only a small number of cases. Those used in longitudinal studies, moreover, must come from homes willing and able to have their children return for testing, year after year. Perhaps they are a special group. Whenever we start with a single group, or *cohort*, moreover, we face the difficulty that some of the changes observed are not due to age but to different experiences that the children encountered at different times. Suppose, for instance, that a group of children all born in 1960 are observed at the age of seven in 1967, and again at the age of twelve in 1972. We find that the children were more frightened of imminent war in 1972 than in 1967. Does this mean a change that ordinarily occurs between seven and twelve? Or could it be that war is really a greater threat in 1972?

To get around some of these difficulties, some psychologists (Schaie and Strother, 1968) have advocated a *cross-sequential* method in which several groups or cohorts born in different years are followed through in longitudinal fashion. If, no matter what the calendar year, children become more worried about war between the ages of seven and twelve, this change could not be attributed to changes that have occurred in the world at large.

Some General Patterns of Development

To obtain an overall picture of the course of development we rely largely on *normative data*. Such data merely give us the characteristics of the *average* child of any given age. Using such normative data, for instance, we could say that the average child can sit up by the age of 7.5 months, stand by 8.5 months, and walk without help by 14 or 15 months. Using the same kind of data for language development, we could say that, on the average, a child can use about 20 words at the age of 1½, and about 200 words one year later. Such data suggest typical or average changes, but they do not tell us what is true for all children, nor what is proper, or to be expected for any single child. Many normal children will fall behind this "norm," and many will anticipate it. Certainly such norms fail to suggest what could be attained under the most favorable conditions.

In the field of physical growth, normative data have revealed some interesting general characteristics. Some of these characteristics that hold for physical growth may also apply to other types of growth that are less easy to observe.

Rapid Initial Growth

In his growth toward adult stature, the child at first puts on a tremendous burst of speed. From the initial union of two microscopic cells, the newly formed organism achieves one-quarter of its total height by the time of birth. To attain this 19-inch length during his prenatal life, he must average 2 inches of growth each month. If he were to continue at that rate, he would be 12 feet tall by the time he started kindergarten. Obviously he does not continue at this fantastic pace. His rate of growth, however, is still phenomenal. Sometime between the ages of two and three the child will attain the second quarter of his height and will then stretch up to half of his adult status. Another twelve to fifteen years will be required to achieve the remaining half. At one point during this twelve- to fifteen-year interval there will occur the well-known adolescent spurt, at which time growth rate may equal that of the early years. Boys, for example, grow on the average of 4 inches in one year during this period, and girls may approach this increase.

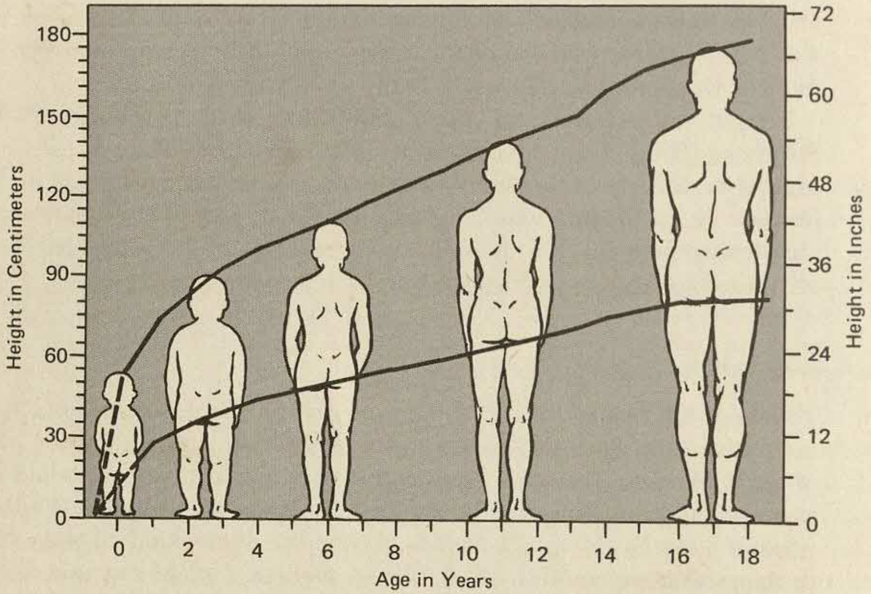


Figure 2.1. Changes in stature and in proportion from birth to age seventeen. From J. M. Stephens, *Educational Psychology: The Study of Educational Growth*, rev. ed. Copyright © 1951, 1956 by Holt, Rinehart and Winston, Inc.

At first glance, height may seem to be a simple unitary thing. But this is illusory. Height is really the sum of many bones joined to each other, and these bones grow at different rates. The head gets an early start. At the time of birth the head constitutes one-quarter of the total height. For the next three years or so, the head will continue to grow rapidly, but after that, its rate of growth will be comparatively modest. Legs, in contrast, have a low initial priority. At birth they make up only one-third of the total height. Year by year this proportion will change, until at maturity the legs will make up almost half the total. In all this, the trunk and the legs may take turns in forging ahead, and if we should look at the behavior of the individual bones, we would find much variation in periods of most rapid growth.

Even in its oversimplified form, of course, the growth curve for height could not be used as a precise fit for other aspects of physical growth. In weight or sheer bulk, it is true, we do find exceptionally rapid increase (14 pounds or so during the first year, and a smaller and smaller increase in the next few years.

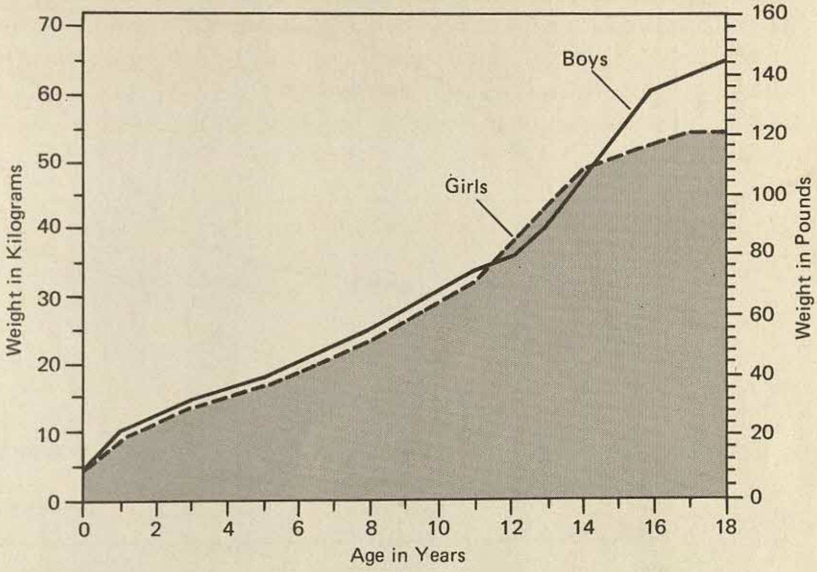


Figure 2.2. Composite growth curve showing changes in weight for selected groups of boys and girls. From J. M. Stephens, *Educational Psychology: The Study of Educational Growth*, rev. ed. Copyright © 1951, 1956 by Holt, Rinehart and Winston, Inc.

From the time he enters school, however, the child, rather than slowing down, puts on a little more weight each year than he did the year just past. Other parts of the body depart even more from the pattern shown by height. The sexual organs develop only slightly prior to the age of ten or eleven, and then begin to grow at a very rapid rate. At the other extreme, the nervous system actually surpasses height in its demonstration of rapid initial growth. By the age of 2½ or so, the child will have acquired 50 percent of his height, but as much as 75 percent of his neural tissue. When, some three years later, he has attained 75 percent of his height, his nervous system will be 90 percent complete.

Having noted this rapid initial explosion in the development of stature, we are tempted to see if a similar rapid growth may hold for other aspects of development. And in intellectual and linguistic development such a period of extremely rapid growth has been suggested. If we had a quantitative scale for these things, we might well find that the child, for all that he still has to learn, had acquired a surprising fraction of his ultimate intellect and of his linguistic skill by the time he began kindergarten.

The Constancy of Development

One of the outstanding phenomena of physical growth is that of constancy in the midst of change. Longitudinal, or follow-up, studies often show the child to be changing tremendously in this physical appearance, but with all that change

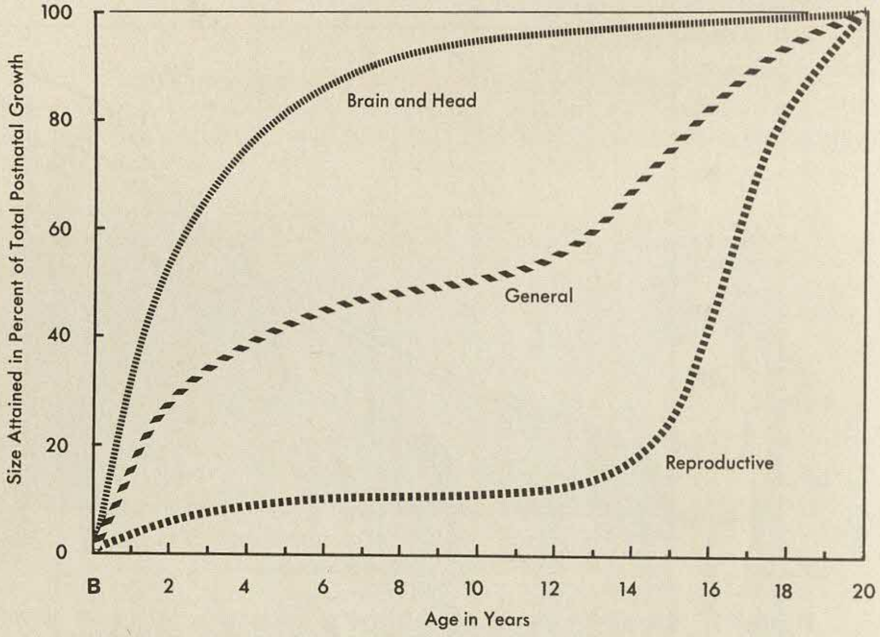


Figure 2.3. Growth curves for different parts of the body. Adapted from J. A. Harris, C. M. Jackson, D. G. Patterson, and R. E. Scammon. *Measurement of Man* (Minneapolis: University of Minnesota Press, 1930).

he remains clearly identifiable and recognizable as the younger child observed earlier. Whatever the modification of its parts, the organism, as such, retains its integrity.

This overall constancy, so dramatically portrayed in physical growth, may also be suggested in the development of intellect and personality. In both of these areas there are marked changes. But in spite of these changes a fundamental pattern seems to persist. The timidities or the creative splurges that characterize George as a preschool child, for instance, may also be noted when he reaches adolescence or early maturity. And other traits or response patterns may show a similar constancy in development over long periods of time. Within limits, this stability or constancy, so interesting in its own right, permits useful predictions. It also sets off speculation about the forces that may be at work.

Differentiation

As development proceeds we often see that large, diffuse patterns of response are replaced by movements that are more specific and more limited in extent. Thus, when subjected to a pinprick on his finger, the neonate may respond by thrashing about in gross fashion, both arms and legs being involved. Later his response to this stimulus will become more limited, and will consist of a more specific and more efficient withdrawal of the hand in question. A similar differ-

Estimating Adult Height from Actual Height at Different Ages

Age of Child (Years)	*Fraction of Adult Height Attained*		*Approximate Multiplier to Use in Estimating Adult Height*	
	Boys	*Girls*	*Boys*	*Girls*
1	.41	.43	2.5	2.3
2	.49	.50	2.0	2.0
3	.54	.57	1.9	1.8
4	.58	.62	1.7	1.6
5	.62	.66	1.6	1.5
6	.65	.70	1.5	1.4
7	.68	.74	1.45	1.35
8	.71	.78	1.40	1.30
9	.74	.81	1.35	1.25
10	.78	.85	1.30	1.15
11	.81	.89	1.25	1.10
12	.84	.93	1.20	1.05
13	.88	.97	1.15	1.05
14	.92	.990	1.10	1.01
15	.96	.998	1.05	1.002
16	.98	.999	1.02	1.001
17	.99	.999	1.01	1.001

SOURCE: Stanley M. Garn, Body size and its implications. In Lois W. Hoffman and Martin L. Hoffman, eds., *Review of Child Development Research* (New York: Russell Sage Foundation, 1966), pp. 529–561.

entiation occurs in emotional response. In observing the very young child we can easily see that he is experiencing some emotion. But we cannot tell whether he is angry, frightened, or pleased. Later on, this single general response is replaced by a large repertoire of specific responses: one for fear, one for pain, one for relaxed pleasure, and others for enjoyable excitement.

Directionality

With respect to motor skills (e.g., walking, skipping, climbing, buttoning, shoelace-tying, writing), differentiation in development follows some clear-cut gradients or directions. One growth direction is that from head to tail (cephalocaudal), whereby effective motor control appears first in the upper portions of the body—lifting the head to avoid choking, for example. Later, torso control extends to the waist and hips, so that the infant may sit voluntarily. Eventually, this control shows itself in the legs and feet, permitting the coordination necessary for walking.

The second major direction taken by motor development is that from the center (axis) of the body to the outer or peripheral regions. Thus, gross motor control over the shoulders and arms, as in ball throwing, precedes the finer motor control necessary for grasping and manipulating a pencil for purposes of intelligible writing. This directional phenomenon (proximodistal) is also noted during the adolescent growth spurt when the torso of the body increases in thickness.

Sequences and Critical Periods

In physical growth we are impressed by the regularity of certain sequences. Prenatal development, particularly, is marked by an astoundingly complex timetable to which the growing embryo closely adheres. Within a few days of conception, one group of cells can be depended upon to grow more rapidly than the others. These rapidly growing cells spill out over the surface, and thus a ball is formed. The ball becomes a hollow sphere. Two sets of cells become separated from each other, and these dependably interact to produce a third layer. And so on, through a regular building schedule intricate beyond comprehension.

The processes of differentiation and of regular sequences are often linked with the phenomena of *critical periods* in physical development. The regularity of the sequences may come from the fact that one sequence is an absolute prerequisite for the next. Hair cells cannot begin to grow until there has been some development of the skin. There can be no differentiation whatever, naturally enough, until there are a number of cells available for differentiation. One developmental condition sets the stage, or provides the necessities, for the next. Once the stage is set, moreover, there may be only a brief critical period during which the second phase of development can occur. If a certain hormone is needed, or if some other treatment is required, this treatment must be applied within a few days or a few hours, or it will be too late. Finally, as soon as a process, such as differentiation, has really begun, it may turn out to be irreversible. We are reminded of melting snow at the peak of the Great Divide. For a brief time the water lying on a flat rock could, with very little effort, be directed to the watershed of the Pacific or to the Gulf of Mexico. At this point only a slight application of effort would send it in one direction or the other. As soon as the first movement is made, however, the drop of water becomes increasingly committed to one of the two possible destinations, and much more energy would be required to make it change its course.

Imprinting and Early Learning One illustration of critical periods comes from the study of imprinting (Sluckin, 1965). This is the well-known process by which chicks and other young fowl come to follow the first moving object they

Mental Deficiency and Climate during the Fetal Period

This study is based on all the children admitted to a state home for the mentally deficient during a period of 36 years (1913–1949). The investigators studied the records of all those who would have been in the third fetal month during the summer months. They also determined whether that month for that particular year was warmer than average or cooler than average. Finally, they found out what proportion of all children for each fetal condition were later admitted to the state institution. From among the children of the "cool June" condition, for instance, there were 1.4 admissions for every 10,000 births. The table gives comparable figures for the other conditions that obtained during the third fetal month.

Proportion of Children Admitted to the State Institution

	Number per 10,000 births		
	Children Whose Third Fetal Month Occurred in		
Temperatures at the Time That the Child was in the Third Fetal Month	*June*	*July*	*August*
Warmer than average	1.40	1.62	1.50
Cooler than average	1.41	1.29	1.20

SOURCE: B. Passamanick, "Determinants of Intelligence," in S. M. Farber and R. H. L. Wilson, eds., *Conflict and Creativity* (New York: McGraw-Hill Book Company, 1963).

see during a brief period after hatching. With some species this period begins within 8 to 10 hours of hatching and ends some 15 to 16 hours later.

In thinking about human affairs, many people have long suspected the existence of similar critical periods. Our literature is full of references to "golden periods," to "tides in the affairs of men," to the need of "striking while the iron is hot," and to the early shaping that cannot be undone by later efforts. Something like imprinting has been held to account for the fact that rejected and punished children come to acquire persisting affection for the cruel and abusive parents to whom they were exposed at an early age (Scott, 1962).

Stimulus Hunger At some time during the first year and a half of life there may be a more extended critical period in which the child is especially responsive to various kinds of stimulation. During this period he is held to need stimulation, to feel a stimulus hunger. He seems to be seeking out sources of stimulation, straining to watch what is going on, and making special efforts to hear the sounds uttered by those around him. Even aversive stimuli, such as the taste of lemon, seem to be intriguing and somewhat attractive. Young children may taste such a bitter substance again and again, even though they object vigorously to what they encounter.

This drive for stimulation, of course, is not likely to be so pronounced when more primitive needs (hunger, thirst, or the need to find relief from pain) are vigorously at work. When these primitive needs are met, however, the hunger for stimulation may assert itself. It has been suggested that this fact may account for the restlessness of many infants at night when physical needs have been assuaged and the supply of external stimulation is somewhat impoverished.

This stimulus hunger may be especially powerful during the first year of life, and may persist with diminished force during the second part of the third. This is the period for which many people urge generous exposure to language and to other symbols with which the child will have to deal.

Exposure Learning The period during which stimulus hunger is markedly at work is much longer than the period of classical imprinting (as seen in birds), and it tapers off much more gradually. Because of these differences some psychologists (Sluckin, 1965) suggest that we refer to this longer interval as the critical period for *exposure learning* and leave the word "imprinting" for the more dramatic phenomenon to which it was first applied.

As in the case of imprinting, this exposure learning of the first year or so is to be contrasted with the kind of learning which becomes prominent in the toddler, and which dominates during the school years. With the toddler, and in later school learning, it is the child's own activity that is held to be of crucial importance. The child learns by *doing* and by experiencing the consequences of what he does. Exposure learning, on the contrary, can be quite passive in nature. Indeed, much of it seems to occur incidentally, or in the absence of direct attempts by others to influence the infant's behavior. During the period of exposure learning, for example, the more helpless infant can merely let the flood of stimuli flow over him, and from this passive exposure can learn much without making any clear-cut response, and without experiencing much in the way of reinforcement. True enough, even in this period the infant is not completely passive. For one thing, he makes the response of tuning in more clearly to the stimuli that are available. And from these orienting responses he experiences the reward, or reinforcement, of perceiving stimuli in more vivid fashion.

One of the great outcomes of the exposure learning is that of increased sensitivity to the stimuli which predominate during this critical period. Later on, the child will unthinkingly give close attention to sounds, sights, and odors that were conspicuous during the period of exposure learning. If words and spoken symbols play a prominent part in the world around him, he will, later on, be markedly sensitive to these things (McCandless, 1967). If these things are lacking during the period of exposure learning, the child, when older, may find it hard to take them seriously.

In a more extreme view, it has been held that failure to be exposed to certain stimuli during this critical period may make it practically impossible for the older child to perceive these particular stimuli at all. The infant in the congested city is exposed to the vast array of sounds arising from street activities and apartment life. Having experienced these sounds during this period, he is later able to make effective use of subtle differences which announce the progress of the rent collector along the hall, or which herald the arrival of breezy Aunt Jean, or which come from the comparative hush of the snowy streets. The wilderness child, in contrast, is early exposed to a quite different flood of swishings, and cracklings, and odors. Later on, subtle differences in these familiar stimuli are automatically interpreted as "deer," or "hawk," or "wolverine." The older wilderness child, transported to the city apartment, might never hear the subtle differences in the sounds by which his city cousin reads the world around him. Conversely, the city child upon moving to the wilderness may be completely unable to detect—let alone interpret—the delicate signals that shout their message to the native guide.

In all these examples we have something akin to the undoubted critical periods of embryological development. The things present during these early periods may be utilized and may crucially affect subsequent development. Ingredients not supplied during this period may be difficult or impossible to provide at a later date. The effects of these experiences, or of their absence, moreover, may readily become cumulative. Suppose, for instance, that a young child is deprived of the experience necessary for adequate development at age five months. Because of this deprivation, and the resulting limitations in his development, he may not be able to deal adequately with the experience he encounters at six months. His development is thus even further impaired by his inability to use this new experience. This compounding effect becomes especially disastrous when skills are arranged hierarchically and when proficiency in a minor skill is necessary before the child can begin to acquire a higher-order skill. This *cumulative deficit hypothesis* appears quite frequently in contemporary discussions of early environmental deprivation (Jensen, 1966; Deutsch, 1964). Support for this hypothesis is seen in the data regarding school failure rates of children from disadvantaged backgrounds, and in the effect of environmental deprivation on subsequent intellectual and linguistic development (Ausubel, 1964).

The possibility of these cumulative effects should remind us that the regularities in development do not necessarily follow from the automatic unfolding of inner forces. Some of the regularity in developmental sequences may merely reflect the regularities in the culture to which the child is exposed. The culture regularly treats the infant in one fashion and the toddler in another. Some things are regularly expected of the preschool child and other expectations apply to the student. And even if there were no inner forces, the culture might regularly impose one role on the teenager and another on the young parents.

The General Concept of "Stages" in Development

The ideas of regular sequences, critical periods, and cumulative development are part of the general notion of "stage" theory. In thinking about development, it would be difficult to ignore the concept of stages. In the development of insects, the caterpillar is markedly different from the cocoon, and both are different from the adult insect. The stages that are so conspicuous in some aspects of development are also suggested in other aspects, and can be invoked in still others. People have often wondered if stages are a universal feature of development, even though they may not always be conspicuous or obvious.

Especially during recent years there has been a vigorous controversy about the existence and role of stages in mental, emotional, and moral development. Some psychologists have insisted that to get a true picture of intellectual or linguistic or moral development, we must imagine something like the stages that are so vividly apparent in the physical development of the embryo. Others have held that there is little evidence for such stages in other aspects of development and that we do more harm than good if we invent them and force all development into the patterns of stage theory.

Stage theory, to summarize, includes some, or all, of the following notions:

1. One stage is the necessary forerunner of the next. During one stage the organism develops the structures that are needed for a later stage.
2. Training is relatively (perhaps completely) ineffective until the child has reached the proper stage. Without the structures ordinarily acquired in one stage, the child cannot hope to master the tasks encountered in the next. Until he can focus his eyes he cannot learn to read.
3. There are critical periods during which the appropriate stimulation (or experience) must be received. If missed at this time, there will be a problem in making up for the lack later on.
4. Many processes are irreversible. As soon as cell differentiation has begun to move in a given direction, its path cannot easily be altered. When a duckling has been imprinted with one moving object, the pattern is not likely to be changed. If a child has been deprived of necessary food during one period of growth, the deficit cannot be made up if we wait until after certain bones have fused. Dialects acquired during early childhood are difficult to modify later on.

Continuity as Opposed to Stage Theory

In contrast to the notion of qualitatively different stages, a number of psychologists stress the concept of continuous, gradual change (Bijou, 1968; Kessen, 1963). In many aspects of development, they contend, we do not see the child moving abruptly from one stage to the other. On the contrary, we see him gradually growing taller, gradually using more and more words, and gradually becoming more and more self-assured. These psychologists hold that we will get a more adequate view of development if we can find a few continuous forces steadily at work, and responsible for the gradual quantitative changes that we observe.

The dispute hinges primarily on the matter of emphasis. Ordinary observation provides examples of things that look like development from stage to stage, and other examples that look like a steadily rising curve. The enthusiasts on either side, moreover, can often show that what seems to be one thing really turns out, upon analysis, to be the other. The continuity theorist, for instance, will hold that the seemingly separate "stages" or "states" of ice, water, and steam are really due to the steady application of a single continuous force such as heat or molecular motion. The stage theorist, on the other hand, will point out that, in other cases, seemingly continuous growth may, upon further analysis, turn out to be based on passage from one stage to another. At one time, for instance, it appeared that in linguistic development the child gradually learned more and more words, and gradually came closer and closer to adult grammar. As we shall see later, however, many present-day linguists hold that this apparent gradual movement is quite superficial. A more careful study, they claim, will show the child to be moving from one clear-cut grammar with its own rules to a quite different grammar with a distinctly different set of rules.

Arguments Against Stage Theory

In the spirited controversy about the role of stages in development, one or another of the opponents of stage theory has advanced a number of arguments against the notion. We consider those arguments most frequently stressed and those that seem most important. At times, we also suggest the rejoinder that the stage theorist might offer.

Stages Artificially Produced It is possible that some of the apparent stages in human development may come, not from any basic built-in process, but from the way the child is treated. Drinking is markedly different from sucking, but the change may come largely from adult decisions. The schoolchild leads a life that differs widely from that of his preschool brother. But again, these pronounced differences come largely in the way the child is treated.

No one, of course, would wish to push this argument too far. Everyone will admit that there are marked qualitative differences that do not come from the way the child is treated. Social convention, it is true, may determine when a girl is to leave the status of childhood and to be treated as a woman. The appearance of the first live egg and the attendant menstruation, however, initiates a new and irreversible stage which does not hinge on convention or ceremony.

Regularity Confused with Necessity In observing the regularity of certain developmental sequences, the stage theorist often claims that one sequence prepares the way for the next. But is this necessarily so? Children often go through a tricycle "stage" before they reach the bicycle "stage." But must they? Does experience in crawling really help develop skill in walking? We can predict that George will belong to a girl-despising gang of boys before he discovers the attractions of feminine charm. But must we conclude that the gang experience helps pave the way for more adequate heterosexual interest?

To this argument, the stage theorist has at least two answers. First of all, in several instances, lack of normal experience in one stage has been shown to have unforeseen effects later on. In monkeys, for instance, the playful tussling and fumbling, normal to adolescence, seems to be a necessary experience on the way to sexual competence in the adult.

In the second place, according to the stage theorist, we would do well to err on the side of caution. Until we are fairly certain that the experience of one stage is not vital to some later development, we would be prudent to assume that it is.

Danger of Relying on Pseudoexplanations To its critics, stage theory may run the risk of seeming to offer explanations that are no explanations at all. The mother wonders, for instance, why little George incessantly asks, "What is this? What is that?" The critic would hold that we gain nothing by saying, "It's because he is in the naming stage." This is sheer tautology. In making such a comment we are merely saying, "He does it because he does it."

Too often there may be some truth in this criticism. If we really had to work out a separate stage for every act to be explained, obviously we would gain nothing. At its best, however, the concept of stage is not nearly so limited. By knowing that the child is in some such stage as "IV-a," for instance, we may be able not only to predict that he will be interested in learning the names of things but also at times to predict that he will be interested in stories about animals, and that he will have a strong urge to do things for himself. There is something to be gained in thus seeing a number of separate ways of behaving as being linked to a single state or stage. Insofar as we can properly link the behavior with a certain stage, moreover, we feel less need to find the explanation in some discreet and unusual (perhaps blameworthy) happening in the child's recent history. If a child at this stage or age regularly has a fear of prowling lions or other wild animals, regardless of his experience with animals, we need not search too hard for the specific incident that brought about this child's fear.

Difficulties in Explaining Movement and Growth In and of itself, of course, the concept of stage is the very antithesis of the concept of development. Stage, or state, suggests a stopping place, a condition of no movement. To understand development, then, we would have to see the machinery by which one stage is abandoned and a second stage attained. And it is in this phenomenon of *transi-*

tion, rather than in the stages themselves, that we would see the real process of development.

Stage theorists would agree that the actual overt growth or movement must take place as the child moves from one stage to another. They claim, however, that the processes at work during the stationary period are necessary for the later transition. In ascending a mountain, for instance, the activity going on during a stop at the staging area is just as vital to the ascent as is the actual movement up the slope.

Greater Scientific Appeal of Continuity The critic of stage theory is worried about the seemingly separate processes of stage and transition. He fears that if we concentrate too much on the different states or stages, we may be tempted to work out one explanation for the processes going on during the stage itself, and a second explanation of the processes by which the child moves from one stage to the next. Looking at the older, better established sciences, the critic asks what would have happened if the qualitatively different states in the physical world had received the bulk of the attention. Water as a state, for instance, is qualitatively different from the state of ice, and the vaporous state of steam is qualitatively different from either. If these impressive qualitative states had completely absorbed our attention, we might have been tempted to work out one explanation of how ice changes to water, a second explanation of how cool water becomes warmer, and a third explanation of how hot water changes to steam. But we get a much more satisfactory scientific picture if we concentrate, not on the diverse states, but on continuous processes, such as temperature and pressure, steadily at work, and capable of explaining all the changes we observe.

Advantages Claimed for Stage Theory

To most of the arguments advanced against stage theory, the proponents of that theory have some reply. True enough, the stage theorists would admit the greater scientific elegance of a valid explanation based on continuous forces. But to be acceptable such an explanation would really have to work. No claims of scientific elegance would make up for a failure to explain the observed facts of development.

Along with their efforts to rebut the arguments of their critics, the proponents of stage theory advance some positive claims of their own. Many of these claims have to do with the advantages stage theory offers in guiding practical decisions.

Need To Explain Clearly Established Stages Any theory, whether stressing continuous forces or a series of separate forces, must take account of those stages that are clearly seen to exist. Especially in physical development we see qualitative differences between the embryo which obtains its oxygen from the mother's blood and the child who does his own breathing; between the prepubescent child and the adolescent capable of reproducing his kind. Other clear-cut stages have been held to exist in linguistic and in social development. These qualitative changes must be explained.

Intellectual and Practical Needs for Segmentation An elaborate process, no matter how continuous, is somewhat forbidding unless chopped up into segments. The whole range of human history, for instance, is just too vast to deal with as one continuous thing. We segment it into eras, or periods, however arbitrary these may be. The continuous changes in the moon are arbitrarily classified by quarters. Continuous changes in light are broken up into dawn, full light, twilight, and dark.

This segmentation meets a practical as well as an intellectual need. Often there is nothing to do about each infinitesimal change. For a long time while the light is fading we need do nothing. At one point we should turn on the lights. There is an advantage in breaking these continuous changes into segments that call for different kinds of action. One decision ("Wait awhile") may be in order if the moon is waxing, or if the tide is coming in, whereas another ("Move fast") may seem wise when the moon is on the wane, or when the tide is going out. Similarly, in the realm of human development, we may decide either to wait or to hurry, depending upon where the child happens to be in his passage along the continuous curve of growth. We will return to this notion in Chapter 10 in relation to assessing readiness for learning.

A General View

All in all it seems clear that we should try to keep an open mind on many of these questions. In some aspects of development, especially in prenatal development, unmistakable stages do seem to appear. In other aspects of development the immediate picture is one of fairly gradual and continuous change. It is possible, however, that underlying these apparent gradual and continuous changes there may be a sequence of clear-cut stages. But the reverse is also possible. Continuity may be the more basic rule, and if we search hard enough we may find constant forces or principles at work moving the organism through one stage and on to the next. From the viewpoint of ultimate scientific truth, this emphasis on continuous forces seems preferable. For an intermediate understanding, however, and for practical guidance, the concept of separate stages, or states, or phases has much to recommend it. Such a segmentation, whether intrinsic or arbitrary, is also more congenial to the intellect, and calls attention to the different kinds of action that are possible and appropriate at different times.

Language Development

Few would deny that language development represents one of the most distinctive domains of the school. Whatever else the school is expected to do, it is certainly charged with the responsibility for helping the child to make more effective use of language. Our linguistic skill sets us apart from other animals. It plays a vital part in the development of the intellect, and is often the key factor in the adequate management of practical affairs. Failure to acquire such skill means a cruel handicap to the individual and a serious loss to society. If the school does fail in this crucial task, moreover, other social agencies stand ill-prepared to make good the deficiency.

The Functions of Language

Language affects our lives in several different ways. Obviously it is a *practical instrument* of tremendous importance. It is through language that we become informed of the world, and it is largely by means of language that we seek to influence the decisions of others, and to safeguard the outcomes of our own decisions. But over and above its role as a practical instrument, language is a form of *play*, or *artistic expression*. We use it even when it serves no practical purpose. The infant babbles happily even when no one else can hear. And the adult relishes linguistic nuances which have little bearing on the message conveyed. In some cultures, indeed, the actual meaning in language is much less significant than its artistic impact (Bruner, Olver, Greenfield, and others, 1966). At still other times, language serves as an *incidental accompaniment to action* that could well take place without it. The child talks about what he is doing. The marcher listens to linguistic cadences. Spoken endearments accompany the bodily caress.

There are, of course, many indirect practical gains from this language which carries no crucial meaning. It provides the child with much practice in the use of language. It also induces social cohesion. The words of the mother, however meaningless to the infant in the next room, still serve as a symbol of her presence. Marching songs and work chanteys also induce cohesion. Like the back scratching of our primate cousins, our meaningless greetings and salutations acknowledge the acceptable presence of the other person.

Often, as we have implied, the different uses of language function quite separately from each other. "How do you do?" is not supposed to serve as a request for precise information, and in such usages there is no need for a precise match between the language and the objective world. At other times, however, the several uses are combined. Great literature, for instance, gives us much information and, while doing so, provides tremendous esthetic enjoyment. Less often, a scientific essay intended chiefly to inform may hold us entranced by the poetry of the language. In the highest reaches of human thought, meaning, of course, becomes paramount. However exalted the symbols used, they must reflect something real in the physical or psychic world.

Aspects of Linguistic Development

Linguistic development proceeds in at least two directions. In one respect, linguistic development means increased ability to use language in correct and effective fashion. Linguistic development could also mean an increased understanding of the rules and principles upon which linguistic communication ultimately depends. Obviously these two aspects of development, although related, are not identical (Deese, 1970; Chomsky, 1965). Although linguistic structures, or sets of rules, are always *used* in effective communication, those rules are not always understood or explicitly formalized by the person using them. In avoiding such a statement as "The pups wants their supper," the child must be guided by some rule, but he may not be able to state the rule. Conversely, knowledge of the rules (does) not always protect us from the occasional grammatical slip. In the preceding sentence, for instance, "does" is clearly correct. But even with this knowledge, a speaker—influenced by the plural word (rules) he has just read—might find himself momentarily tempted to use the word "do" instead.

From the many different topics discussed by linguists and psycholinguists, we select a few that reflect the child's growing mastery of the language to which he is exposed. First of all, linguistic development is shown by an increase in *verbalization rate*. The one-year-old does well to utter one word. The three-year-old emits an unceasing torrent. As he grows older, the child also gains skill in *articulating* or *pronouncing* the words he does use. The babyish pronunciation changes to the style used by those around him. More and more the child's use of words in sentences and phrases shows a comprehension of the *meanings* or *semantic* properties of those words. We can properly say that he acquires a larger vocabulary. Perhaps the most dramatic linguistic development is the increased mastery of the *grammar* or *syntax* of the language of the region. Linguistic development also shows itself in the changes in the whole *communicative style* that the child uses in getting his ideas across to others.

Articulation To become competent in his native language, the child must learn to produce each of the sounds that are considered distinctive in that language. In English, for instance, there are some forty-four sounds that people regard as being different from one another. The sound of *a* in "fat" is different from its sound in "fate." The proficient speaker of English must be able to utter both sounds. True enough, the sound of *a* in "fat" is far from uniform. If we had a dozen different people each utter the word "fat" several times, we would find a wide range of sounds for the letter *a*. But, in the English language, most of these differences would be ignored, and this whole cluster of sounds would be treated as a single unit or *phoneme*. Similarly, the English-speaking person will ignore the many different ways of pronouncing the *a* in "fate." This whole cluster of pronunciations will also be treated as a single phoneme. In other languages the differences that one ignores in English may be very important. In Chinese, for instance, the *a* uttered with a high pitch would have one effect, whereas the effect of the same *a* emitted in a lower pitch would be entirely different. In English these two sounds would belong to the same phoneme. In Chinese they would be different phonemes.

In the task of being able to utter the separate phonemes that matter in his language, the child begins to show progress at an early age. Some phonemes will appear at the age of *two months* or so. These, of course, are to be heard, not in formal conversation, but in the more primitive process of crying or complaining. These outbursts, however unlinguistic they may sound, could include as many as seven or eight different phonemes that play a part in the English language. In these seven or eight phonemes, the more explosive consonants will predominate. By *four months* the infant will have given utterance to many vowel sounds. By the age of *eight months*, or so, he plays endlessly with these speech sounds, and in the next few months he will produce most of the sounds possible in speech, including some that he will not use in his own language.

It is one thing, of course, to emit speech sounds in the course of random babbling, and quite another thing to produce distinctive sounds in voluntary fashion during systematic speech. This comes later. In this deliberate or systematic use of language, the child probably first succeeds with the broad phonetic distinctions (Jakobson and Halle, 1956). There is most difference, for instance, between vowels as a group, and consonants as a group, and this distinction is achieved fairly soon. Among the consonants the most clear-cut difference is probably found between the "stop" consonants (*p* or *t*), on the one hand, and "nonstop" consonants (*m* or *f*), on the other, and this distinction is often the next achievement. At this stage, however, the child might still be confused between a "stop" that is "voiced" (*b*), on the one hand, and a "stop" that is not "voiced" (*p*), on the other. Success with this more difficult discrimination will come later.

From "Wabbit" to "Rabbit" with Little Special Help

In one area, a total of 293 first-grade pupils were identified as having difficulties in articulation. These children were given a diagnostic test and were observed at intervals during the next two years. In taking the test, the children were asked to repeat words illustrating typical articulation problems (*r*abbit; *s*oap; *z*ipper; tee*th*; mat*ch*es; *j*ar; *sp*ider; *tr*ee). They were also required to repeat short sentences and to produce individual letter sounds. The children who made the best scores on these tests were most likely to get over their difficulties within a year or so. With no special remedial work, 25 percent of the children had overcome their difficulties by grade two and 47 percent by grade three. Tests such as the one used might help pick out the children who do not improve on their own.

SOURCE: Charles Van Riper, A predictive screening device for children with articulatory speech defects, *Cooperative Research Project 1538*. Washington, D.C.: Office of Education, 1966.

Some of this growth in pronunciation may come from sheer development of the vocal apparatus. Much may be due to improved ability to discriminate between the sounds heard in the speech of others. At any rate, there is typically much room for improvement in the articulation of the kindergarten child. Such a child may well request a "poon" so that he can eat his "thoup," or may talk about his "wabbit." By the age of seven or eight, however, such mistakes will be rare. Systematic remedial work in the kindergarten (Weiss, 1965) may well hasten this development, and may be especially fruitful for children from poorer neighborhoods.

Meaning and Vocabulary By the age of ten or twelve months the infant will respond appropriately to simple words like "come," "give," or "no," especially when these are accompanied by gestures. Between the ages of ten and twelve months he may also utter the first sound that his parents can identify as a "word." At a year and a half he will use some 20 words, and from then on the increase is a veritable explosion. By the age of two he has mastered 275 words and, normally, his vocabulary will rise to several thousand words by the time he enters first grade (McCarthy, 1954).

The spectacular growth in vocabulary has attracted a good deal of attention. As we note later on, moreover, vocabulary is closely linked to measures of general intelligence, and it clearly reflects the intellectual style of the child's parents and home (Stodolsky, 1965). And obviously, up to a point at least, an extensive vocabulary greatly facilitates schoolwork. It is not surprising that earlier educators—Maria Montessori, for instance—showed great interest in programs specifically designed to increase the child's vocabulary. More recently this emphasis has been questioned (Blank and Solomon, 1968). The child with a limited vocabulary may also be the child who is deficient in the general linguistic machinery for handling vocabulary. And little good may come from merely loading additional words on to these overstrained linguistic structures.

Mastery of Syntax By the age of three and a half or so, the child becomes reasonably proficient in following the grammatical rules in the language used by his parents. Obviously he cannot state those rules, nor could he comprehend them, but he does use them reasonably effectively in his talk.

To produce this amazing accomplishment, many forces, no doubt, combine (Brown and others, 1969). Some part of it may come from sheer imitation as when the child approximates a sentence used by his parents. Most of the early sentences used by the child, however, in no way resemble the adult sentences that he hears. "Allgone Daddy" is not the phrase the mother uses to describe the father's absence. When used by the child, it is a sentence he constructs by putting words together according to some unformulated "rules," or to some grammar that guides his speech.

According to some psychologists (McNeill, 1970) grammatical development does not come from making better and better copies of sentences actually heard in the adult world. Such development occurs when the child actually produces better and better "grammars." The grammar operating at any one stage is used, not to copy, but rather to create the sentences typical of that stage.

In the very earliest grammars, many children use a very few *pivot* words or operators such as "want," "where," "that," or "allgone." These few pivot words occur over and over again. Along with these pivot words we find a much larger group of *content* words, each of which is used only occasionally. When a content word such as "milk," "bow-wow," "mama," "ball" is coupled with one of the few pivot words we get the familiar childish sentences, "Where mama?" "That (is the) bow-wow," "Want ball," "Allgone milk." These are not sentences that he hears adults use, but sentences that he creates using his own unformulated working rules.

This primitive (and unconscious) classification of words is not very efficient. The class of *pivot* words may include verbs (want), interrogatives (where), and adjectives (allgone). Content words are not restricted to nouns but may also include prepositions (want *up*), adjectives (want *dry*), or verbs (want *run*). As difficulties develop, this basis for classification will change to emphasize the distinction between action words, on the one hand, and nounlike words, on the other. This distinction happens to be stressed in many sophisticated languages, and once he has attained it the child will continue to use it.

With increasing maturity the child makes finer and finer distinctions. He treats adjectives, for instance, as one class, and prepositions as another. True enough, he never talks about these distinctions or gives names to them. He shows his mastery, however, by his reasonably correct usage. Investigations of word associations also suggest that as the child grows older these grammatical classes exert a powerful influence on him (Entwisle, 1966). Before these grammatical classes come to dominate, word associations are largely determined by habitual word sequence. When the young child hears the word "bright," for instance, he is most likely to think of "sun." If he hears you say "once" he may follow through with "aponna" (Once upon a time). As the more formal grammatical classes come to dominate, however, the most frequent response to "bright" will not be "sun," but "dark," and the most frequent response to "once" will be "twice." The influence of the grammatical class is so powerful for the older child or adult that upon hearing a word that happens to be drawn from one "bin" (or grammatical class) he is almost compelled to reach into the same bin for the word that will follow. The restrictive force of these grammatical classes becomes more compelling as the child moves through the early school years. For only about 17 percent of kindergarten children, for instance, will one adjective suggest another adjective (Entwisle, 1966). By the third grade this figure will rise to 70 percent.

A host of other distinctions must still be made, and in coming to employ these distinctions, the child must learn the subtle *signs* or markers which tell him whether the word is being used as subject or object, whether it is singular or plural, negative or affirmative, possessor or possessed. Some of these distinctions, being more difficult to master than others, are acquired at a later date. Attempts have been made (Bellugi-Klima, 1969) to arrange these syntactical rules in order of complexity. It is not until the age of four or so, for instance, that the child can use the passive voice (Billy was hit by a car) as the semantic equivalent of active voice (The car hit Billy). It is even later before he can make use of embedded or defining clauses (The boy *who brings the paper* is here).

To say that the child probably works out his own syntactical rules is not to say that this process cannot be facilitated by good modeling procedures. According to Cazden (1965), for example, adult reactions to the child's talk may have a definite facilitating effect. On hearing the child's statement, an adult could remain silent, could respond with a curt "Yes," could expand the child's statement, or could extend the child's remark by bringing in related or supplementary ideas.

Are Children More Likely to Follow a Grammatical Form When They React to Each Individual Sentence?

Each of 17 preschool children, aged four to six, listened to a story (dealing with animals and children) which involved a number of different grammatical rules. In this group (repeat group) the child heard the story twice. In the first presentation the reader stopped after each sentence and asked the child to repeat that sentence. The child then listened to the whole story read as a unit with no interruptions. In a second comparable group (no repeat group) each child merely listened to the story as it was read twice as a single unit, with no interruptions in either presentation. The children were not asked to make any comments during these presentations.

At the conclusion of the presentations, each child repeated the story and answered questions about it. He was scored in a number of ways.

	Repeat Group	*No Repeat Group*	*Difference Significant*
Reproduction of the grammatical forms	6.6	3.5	Yes
Reproduction of the ideas	4.5	3.4	No
Introduction of wrong ideas	1.6	2.2	No
Elaboration of ideas	1.8	0.7	Yes

In the repeat group the reproduction of grammatical forms was more clearly related to the child's mental age. The brighter children in both groups reproduced more correct ideas and introduced fewer incorrect ideas.

SOURCE: Marion Blank and Sheldon M. Frank, Story recall in kindergarten children: Effect of method of presentation on psycholinguistic performance, *Child Development*, 1971, **42**, 299–312.

Child's Utterance	*Expansion* (Adult Response)
"Daddy work?"	"Daddy is going to work."
"Kitty run?"	"Yes, the kitty is running."

Here the adult gives a more complete and a grammatically correct version of the child's presumed ideas. He does not add to those ideas, nor does he provide any new grammatical twist.

Child's Utterance	*Extension* (Adult Response)
"Daddy work?"	"Yes, but I will be back to play with you after your nap."
"Kitty run?"	"Yes, the dog is chasing the kitty; the kitty is frightened."

Extensions, in contrast to expansion, have the effect of maintaining a conversation with the child. The adult contributes a related idea, one that carries the presumed idea of the child into a wider context. In doing this he also presents additional grammatical patterns. There is some suggestion that the technique of extension surpasses that of expansion in promoting the acquisition of syntax (Cazden, 1965). Both of these procedures are clearly superior to constricted feedback, such as "yes" or "no" answers.

Verbalization Rate In the aspects of linguistic behavior discussed so far—articulation, vocabulary, and syntax—there is a steady progression from infantile toward adult status. The child's progress in these aspects, moreover, is important in the classroom. Teaching must be geared to the degree of development that has occurred. Rate of verbalization, on the other hand, is significant in a somewhat different way. Under ordinary circumstances, rate of verbal output adds little to our picture of development. The four-year-old does not necessarily emit more sounds per minute than does his two-year-old brother. Rate of verbalization becomes a problem when any child beyond eighteen months or so speaks very little, or not at all. This condition in preschool, kindergarten, or wherever, calls for special treatment, typically in cooperation with a remedial specialist.

Style of Communication With respect to style of communication, the child does show the typical progression from an infantile style toward the style of the adults with whom he associates. The style of the eighteen-month Vermonter is not greatly different from that of the eighteen-month Georgian. By the age of six years, however, if legend is to be accepted, the New England child may express himself chiefly in laconic phrases, whereas his Georgian cousin may use an elaborate, rhetorical flourish for the simplest greeting.

For the teacher, the important question is not, "How far has this child progressed in his approach to the communicative style of his adult associates?" but "*Which* style has he adopted?" or, "How many styles does he command?"

The type of style or the number of styles has great significance for the classroom, as it has for life.

One group of psychologists and sociologists (see Bernstein, 1961) holds that social classes differ markedly in communicative style. Lower-class groups use only one style of communication, and a style that is very *restricted*. This restricted language may consist largely of exclamations or incomplete sentences. These are often stereotyped repetitions of expressions popular in local small talk or in the current slang. In these exchanges, repetition and redundancy is the rule. "Those kids don't know where to stop." "Sure don't." "Can't figure it out." "Beats me." The same point may be made over and over again with only slight variations in phrasing. This restricted language serves fairly well to underscore action, or support a mood, but turns out to be awkward and inefficient when it must be used to convey precise information.

The middle-class family has two languages at its command. Within the family itself, or with intimates, there is much use of a restricted language made up of stereotyped phrases (middle-class phrases, of course) repeated over and over again. These provide acceptable social noise, or indicate a mood. On more formal occasions, however, as when strangers are present, or when there is need to convey precise or important information, the middle-class home switches to an *elaborated* language. This resembles the formal written language. The sentences tend to be complete and grammatical. There is relatively little repetition or redundancy. Like the written language, this spoken, elaborated language can stand on its own feet, and convey meaning even without the help of action or gestures. The child who grows up in the middle-class home thus learns two languages, and he also learns when to use one and when to use the other. He knows when words mean what they say in no-nonsense fashion, and he also knows when they are mere pleasantries.

Having only a restricted language at his command, the lower-class child cannot switch from one style to another. He cannot easily move into the world where words can have serious meanings of their own, irrespective of the action being carried on. For him, "Yes" is chiefly something that goes with a smile and means "I like you" or "I want to please you." "No" goes with a frown and means "Damn you! You can't have it." Within the classroom he faces problems whenever these familiar words no longer serve their accustomed, lower-class function. In the grim business of conveying precise information, "Yes" may not be the answer that pleases. In this bewildering new world, this placating word may, unaccountably, give offense, and may lead a powerful adult to act in a critical and rejecting manner.

The social classes not only differ in the type of sentences constructed. They may differ also in the part that verbal language plays in the communication within the group. In the lower-class home, the language of words often carries less significance. In this noisy world, the hunger for general auditory stimulation is met, and more than met. To survive at all, some of this overabundant noise must be tuned out or ignored. Sounds that mean something must be noticed.

The slowing down of the police car or the drunken lurch on the stairs may demand unquestioned attention. Within the home, however, the language of words is often something that can safely be ignored. As the child accepts the invitation offered by the smile and the opened arms, he need not listen carefully to the words of endearment. In drawing back from the threatening gesture, it is not so important that he also listen to the verbal exclamation of anger. Seldom is he required to deal with words when the more primitive stimuli are lacking. With this type of experience, the ghetto child may come to school as an accomplished master in disregarding the unique communicative function of unaided words and symbols.

In the contrasting middle-class home there may be less meaningless noise to be tuned out. In this more subdued auditory environment, the sounds that do occur may receive eager attention. These quieter sounds, moreover, are more orderly and they fit more easily into a pattern. In this quieter and more ordered world, moreover, language plays a unique and important part. In attending closely to different words that really count, the child is reinforced by many interesting and important experiences. Here language is not only a supportive or intensifying background for action that would be self-sufficient in any case. Language is often the substitute for the more primitive act or signal. Ignore it, and you miss out entirely. There is no temptation to tune it out, and there are many rewards for giving it a high priority among things to be listened to. For the child from this background, the classroom is simply one of the places where he is supposed to use the elaborated, formal language with which he is already familiar.

General Background Factors

Along with its influence on communicative style, the home exerts other influences on the child's linguistic competence. Different homes provide different models of pronunciation and grammatical usage. Homes also differ in the number and variety of words employed. Middle-class children are more frequently read to, and thus receive more exposure to the kind of language they will encounter in school subjects.

In the middle-class home there is often more deliberate attention given to the processes of naming and labeling. A child thus stimulated should acquire a greater store of names and labels, and this will stand him in good stead during his school years. More important, perhaps, he may also acquire a strong general tendency to go in for naming and labeling on his own whenever there is any occasion for it.

Ordinarily the middle-class child profits greatly from this tendency to seek out labels for the things he deals with, and from his ability to apply those labels in consistent fashion. Suppose in his city, for instance, that traffic moves east on even-numbered streets and west on odd-numbered. Mastering this task will be much easier for the child who has a strong urge to use such labels as "odd" or

Social Class and Maternal Behavior

Thirty-one mothers were observed with respect to the way they treated their children in the presence of an interviewer. The mother's behavior was later rated for several traits and was correlated with the social or economic status of the family.

A positive correlation (see the Appendix, pp. 648–658) means that mothers from the higher socioeconomic group were more likely to use the practice.

	Correlation of Behavior with	
Behavior of Mother	*Mother's Education*	*General Socio-economic Status*
Grants autonomy to child	.44	.28
Cooperates with child	.01	.19
Excessive physical restraint of child	−.35	−.28
Intrudes into child's activities	−.20	−.26
Use of punishment	.09	−.19

SOURCE: Nancy Bayley and S. Schaefer, Relationships between socioeconomic variables and the behavior of mothers toward young children, *Journal of Genetic Psychology*, 1960, 96, 61–77.

"even," and who uses those labels accurately. The problem will be more difficult for his classmate who pays little attention to labels anyhow, or who is less skillful in their use.

The advantage for the proficient labeler will continue even if the student is called upon to make a *reversal shift*—if in one section of the city, for instance, the rule were reversed and traffic now moved east on odd-numbered streets. Success still hinges on the distinction between "even" and "odd." Once made, it is merely necessary to change the way of responding to these two labels.

The proficient labeler would find a reversal shift, such as that just described, to be much easier than a *nonreversal shift*. A nonreversal shift would be required if, in a different section of the city, the old rule were changed to "From 7:00 to 9:30 A.M. *all* traffic moves east; from 4:00 to 6:30 P.M. *all* streets are west bound." Here the problem is to forget about old labels (odd–even) and to attend to new labels (time of day). For the student already fixated on the old labels, this might prove difficult. For people who have less relish for labels, anyhow, or less skill in the art of labeling, both kinds of shift would be difficult, but the nonreversal shift would give no more trouble than the reversal shift. In general, it turns out that for middle-class children reversal shifts are much easier than nonreversal shifts. For lower-class children, on the other hand, the two kinds of shifts are equally difficult. The superiority of the middle-class children lies largely with the reversal shift in which the naming and labeling process greatly helps.

Language Deficiencies in the Ghetto Child Clearly children from less-favored districts often find difficulty in dealing with the linguistic tasks of the school. The question is how to explain this fact and also, perhaps, how to react to it (Baratz, 1969). Some attitudes are decidedly unflattering to the ghetto child and his family, whereas others may seem less condemnatory. It is quite possible, although distressing to contemplate, that the background conditions such as those described have led to a *general* linguistic deficiency on the part of the ghetto child. Lumping all kinds of linguistic skills together, we simply find that he is not as far along in their mastery. The task of the school, then, is to provide remedial treatment aimed at *general* linguistic development (Raph, 1967). A second view questions this notion of *general* deficit. The ghetto child may have made marked progress in mastering one language. But the language he has mastered may not be suited to the work of the school. This language may lack the precision and the emphasis on abstractions that is needed to do well in many academic tasks. The task of the school, according to this view, is to supply the specific features now lacking. Either through special exercises (Bereiter and Engelmann, 1966) or by individual tutoring (Blank and Solomon, 1968), children should be given special training to enable them to communicate in more precise fashion and to increase their mastery of abstract concepts. A third view sees neither general nor specific deficiencies in the language that the ghetto child has acquired nor in his ability to master linguistic problems. According to this view, it is not that his language is basically unsuited to the treatment of abstractions but merely that it treats them in a different way. There is nothing wrong, as such, with the language the ghetto child has mastered nor with his ability to master language (Cole and Bruner, 1971). It is merely that this is not the language that happens to be used in the school. Even when he does gain some competence in the "new" language of the school, moreover, the child's earlier language may interfere. Unlike his middle-class colleagues, he lacks experience in switching from one code, or one language, to the other. This last interpretation should lead to a less scornful attitude toward the problems of the ghetto child.

In considering a more tolerant and less condemnatory attitude, we are not moved merely by kindness and goodwill. In wholeheartedly accepting the language the child currently uses we not only contribute to his morale but reduce the anxiety that often interferes with improvement. As in our attitude toward the kindergartener's baby talk, we could readily accept social or ethnical peculiarities of speech for children in this stage and hope that maturation, guidance, and unfrantic instruction will gradually change the situation.

Summary

Child development is treated in different chapters, intellectual growth and the general pattern of development being treated prior to Part II, and the remaining aspects treated in Part III of this book. Information on child development comes from the careful study of individual cases, from the longitudinal study of a group of children who are followed through the years, or from a comparison of children of one age with those of another age (cross-sectional method). Each approach has advantages and hazards.

Data from one technique or another present a general picture of rapid initial growth followed by more gradual increases. This pattern varies from one area (brain development) to another (sexual functioning). During this growth, the child retains much of his unique identity as it becomes differentiated into more and more complex forms. Some of this development involves critical periods, such as imprinting, during which the needed experience must be supplied if it is to be effective. In human infancy these may consist of periods of stimulus hunger in which exposure learning may be quite effective. Deficits experienced during periods may lead to loss of potential, and these, in turn, may produce still other deficits.

The concept of developmental *stages* has provoked much controversy, and some students suggest that the process of development is basically continuous. Even when we seem to see resting periods followed by rapid change, continuous but hidden changes may be going on. Stages (preschool versus pupil) may be arbitrarily imposed by the culture. The dispute is probably one of emphasis. The use of stages is convenient and calls attention to appropriate action.

Language development is a distinctive human characteristic. Language promotes precise communication, serves as an artistic outlet, and furthers social cohesion. Language growth is manifested first by sheer increase in the amount of talk, and second by greater skill in articulation. The latter calls for the different pronunciation of different phonemes, and some of these may cause trouble even in the first years of school. Growth in language is also shown in the mastery of more and more word meanings. After eighteen months or so this proceeds at a phenomenal rate. These many words are incorporated into some kind of grammar and syntax. The child moves from one definite syntax to another until he approaches the usage of those around him. Some theorists hold that each child creates his own syntax, later abandoning it for one that is more adequate.

The child not only comes to use the grammar of those around him but adopts the prevailing communication style. This can be sparse or florid, cryptic or elaborate, elliptical or spelled out in precise grammatical detail. Some children must learn one style for "company" or for the school, and another style for home or for

intimates. Other children are exposed chiefly to one style. Some styles lean heavily on accompanying intonations or on gestures or other physical acts. Others, like those of formal writing, are self-sufficient. According to some theorists, the school difficulties of the ghetto child come from his lack of exposure to a sophisticated style. In vigorous opposition to this view, however, other scholars hold that the ghetto style is no less elaborate but merely different.

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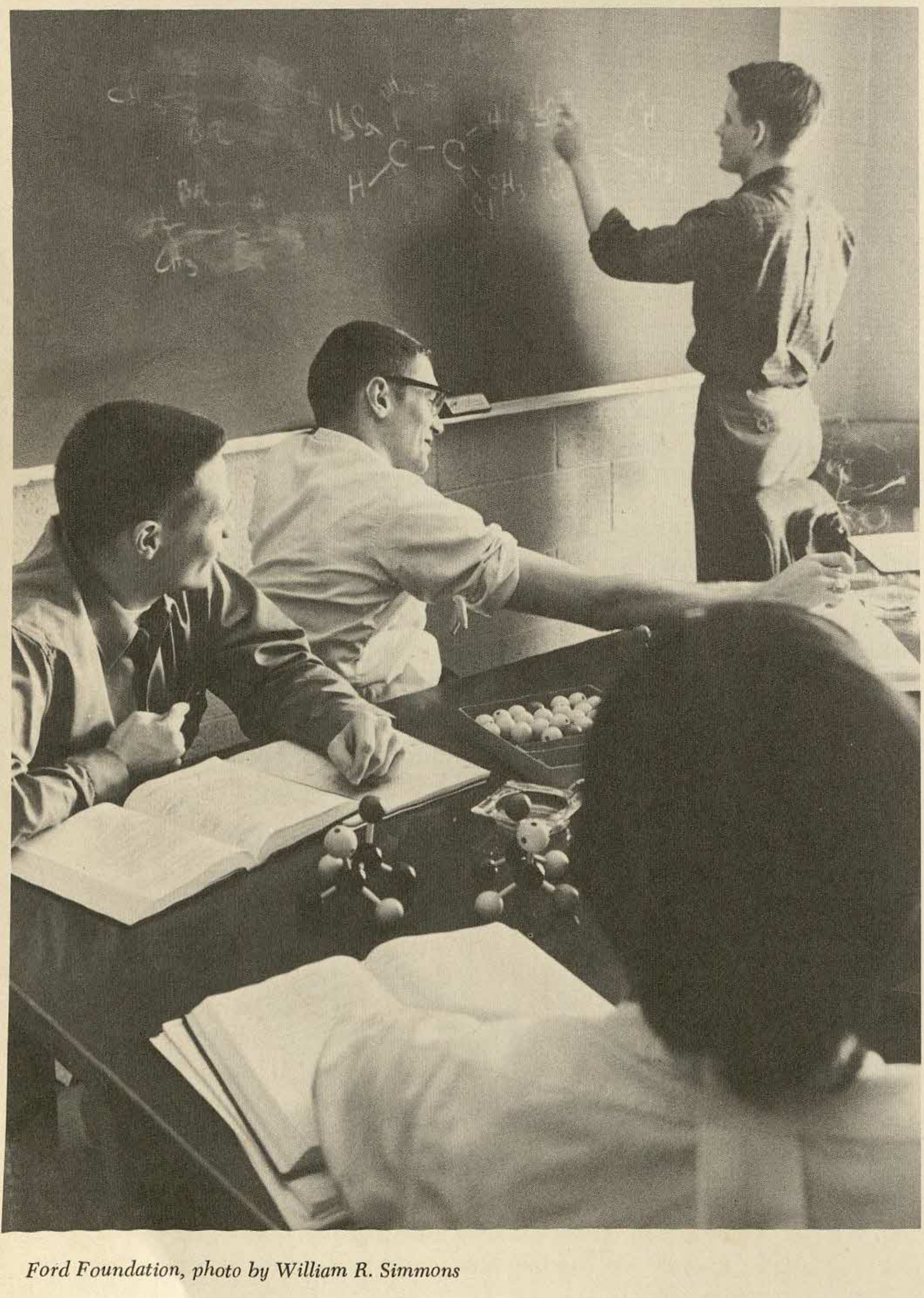

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3

Development of Intelligence and Cognitive Skill

Intellectual ability, or intelligence, has been notoriously hard to define. In discussing the topic here, moreover, it would be extremely difficult to give a blanket definition of intelligence which would serve in all circumstances in which the term is used. Rather than attempt such a definition, it is wiser to stipulate the more important ideas that should be associated with the term as we use it here. For one thing, intelligence, as revealed in the typical test, is linked with ability to get through school. It is also linked with the ability which enables a child to deal with ideas, relations, and abstract concepts. It is closely related to the use of language. Most tests of intelligence, for instance, lay great stress on symbols, on the meanings of words, and on the ability to see relations between words. Intelligence is not identical with linguistic ability, however. Even in ordinary commonsense discussions we distinguish between glibness or fluency, on the one hand, and profundity, on the other.

Intelligence as a System of Knowledge

In England and in the United States, as we shall see, discussions of intelligence have been organized around the tests used, the usefulness of those tests, and the number of separate abilities involved. In other regions there has been less emphasis on the tests themselves. In the first view to be considered, as it happens, intelligence is regarded as a system of thought and awareness, corresponding to the physical systems of respiration, or circulation, or digestion. Just as these latter things deal with air, or blood, or food, so the cognitive system could be considered to deal with the world of subjective experience. And, again like the more physiological systems, the story of intellectual development might show how the various parts or structures of this cognitive system arise. Such an account would be an embryology of the intellect.

This view of the intellect as a cognitive system has been worked out by the Swiss scholar Jean Piaget over a period of many years (see Piaget and Inhelder, 1969). In some parts of the world Piaget's ideas have been taken seriously ever since they began to be published in the 1920s. Many of the notions, however, did not fit readily into the main stream of American psychology, and for a time the theory was relatively neglected in the United States. It was not until the middle of the 1950s that it reached its outstanding position in this country.

Piaget's theory, by the way, is a brilliant example of many aspects of theory making, discussed in Chapter 4, and also deals explicitly with some of the characteristics and functions of a good theory. Like many other good psychological theories, of course, it is highly controversial. At base, moreover, it is extremely difficult to understand. It is really a mathematical theory of knowledge, continuing the age-old problems of epistemology as posed by such philosophers as Hume and Kant. To the inherent difficulties of this abstruse subject, Piaget has added the intricacies of modern mathematics and symbolic logic. His treatment bristles with mathematical groups and groupings; with lattices and semilattices. The more general notions, however, can be described in ordinary English, and it is with these that we shall deal.

The Gradual Mastery of Chaos

As adults, it is difficult for us to grasp the unbelievable confusion of the child's early experience. Lacking the adult machinery for handling such things, he must greet each new momentary sensation as if it were distinct from all previous experience. An approaching bottle of milk, for instance, would not be a single experience but a succession of separate "frames." Each separate frame, moreover, would contain, not recognizable objects, but only meaningless bits of light, sound, and other isolated sensations.

To live effectively, the child must acquire the devices, or machinery ("structures," as Piaget likes to call them), which transform the confusion of raw experience into dependable and manageable patterns. And intellectual development is the process of acquiring each of these intellectual structures, and acquiring each in its proper sequence. One of the early structures, for instance, enables the child automatically to experience a number of sensations, not as completely separate things, but as all pertaining to one object, such as the bottle of milk. He is now required to deal with a limited number of objects and is no longer forced to deal separately with a host of individual items.

As we shall see in more detail later on, the child gains much from the process of automatically attributing sensations or stimuli to real objects in the outside world. He is still assailed by a vast number of separate isolated stimuli, however, objectified though some of them now may be. He needs new devices so that he is not required to treat each succeeding mouthful of liquid as a separate problem to be mastered on its own. He must work out, or stumble upon, some general methods of mouthing and swallowing that will work for many foods. In him there must develop some structure so that whole groups of substances can be treated in the same way—so that, so far as *treatment* is concerned, he can act as if there were no differences in these various substances. He must—for some purposes—disregard differences, or variations, and achieve *invariance*.

The Interaction of Maturation and Experience

Embryology and anatomical growth serve as useful models of intellectual development. Intellectual development comes from the acquisition of cognitive "structures," just as physical growth arises from the development of anatomical structures. The cognitive structures, of course, are not physiological tissues and organs, but things like concepts, beliefs, abilities, or perceptual styles.

Influenced by his embryological or anatomical model, Piaget lays great stress on the continuous interaction between maturation and experience. At any stage of development the structure existing at that time will interact with the environment, thus producing some effect. The respiratory structures of the newborn infant permit him to take his first breath. The total experience of breathing, moreover, modifies these respiratory structures. If he does his breathing at sea level he will develop one kind of lung structure. Living high in the Andes, he would acquire somewhat different lungs. Because of these changes or *accommodations* in the structures used for breathing, he can now carry on additional kinds of activity—more intense and more prolonged activity, more varied vocalizations—and these new activities, in turn, produce further changes or accommodations.

Equilibrium as a Governing Process

This continuous interaction between the structures, on the one hand, and the world around him, on the other—between maturation and experience—is the key to development. At any one time, as we have seen, the child will have inherited or developed some structures for dealing with the world that he has experienced so far. So long as these prove adequate, he has established some sort of harmony, or equilibrium, with the world. When a very different experience comes along it is important that this equilibrium be maintained, or, failing that, that some new equilibrium be acquired. This process of maintaining, or regaining, an equilibrium is called *equilibration*. To deal with either a threatened disequilibrium or an actual disequilibrium, the growing child has two mechanisms at his disposal. The first of these is the mechanism of *assimilation*. The second is the process of *accommodation*, already mentioned. In its more general sense, the word "assimilation" means to make similar, or to ignore a difference, or to eliminate a difference, or to treat things as if there were no difference between them. An immigrant group, for instance, is considered assimilated into the new country when the newcomers cannot be distinguished from the earlier residents, or when they are treated as if there were no difference. Food is assimilated into the body when it cannot be distinguished from the tissues into which it is absorbed.

So long as it works, assimilation can ward off, or nullify, a possible disequilibrium. At birth, for instance, the child has some sensorimotor machinery for getting and swallowing milk. For milk, these mechanisms provide a comfortable equilibrium, but a completely new experience, such as warm water in the mouth, could conceivably bring about a disequilibrium. To prevent this, the process of assimilation permits him to treat this new experience as if it were exactly the same as warm milk. For the purpose of swallowing, that is to say, he can act as if warm milk and warm water are *invariant*. From this device he is able to escape any threat this new substance may offer to the equilibrium earlier attained.

But there are limits to what assimilation can accomplish. Following the principles of assimilation, for instance, orange juice introduced into the mouth could be treated as if it were no different (invariant) from milk. Because of the acid quality, however, the milk-swallowing mechanisms may not produce smooth-working results, and some disequilibrium may follow. To the extent that assimilation fails (and it seldom achieves perfect results), accommodation must come into play. In dealing with the stinging orange juice, for instance, several different kinds of accommodation may develop. There may be a sheer physiological change. Through physiological conditioning, the glands may simply begin to secrete a more copious supply of alkaline saliva at the first sign of the imminent orange juice. The accommodation can also come from a behavioral change. The stinging liquid, for instance, can be mouthed around in a less sensitive area before being transferred to a more critical part of the palate.

Throughout life these mechanisms of assimilation and accommodation will come into play—to preserve an existing but threatened equilibrium, or to attain a new equilibrium when an earlier adjustment has been upset. A barefoot toddler, for instance, walks happily on green carpet, and has attained effective devices (structures) for dealing with this problem. There is an equilibrium. He is now taken outdoors to a green lawn. According to the principle of assimilation, he may react to the lawn as if it were exactly the same as the carpet. If the lawn is smooth, and the grass tender, this may produce no upset to the equilibrium earlier attained. If the lawn is pebbly or prickly, however, some distress or disequilibrium may come from thus ignoring the difference between grass and carpet. To establish a new equilibrium, the mechanism of accommodation must come into play. At the anatomical level, this mechanism could consist of a toughening and thickening of the skin. At the neurological level, the accommodation could be achieved by negative adaptation stressed in adaptation-level theory (see Chapter 4). At the behavioral level, the necessary accommodation could consist of a new way of stepping or walking which minimizes the discomfort and thus reestablishes the child's smooth commerce with the world.

Of these two processes, assimilation has a built-in priority over accommodation. Upon first encountering something new—the tail of the cat—the first strategy is to treat it as if it were the same as (invariant from) something already familiar—the rubber tube hanging from the playpen. It is only to the extent that this strategy fails to dispel a disequilibrium, or when it introduces a new disequilibrium, that the mechanism of accommodation comes into play.

The Attainment of Invariances

According to Piaget, it is through the attainment of legitimate invariances that the child becomes able to subdue the confusing flux of experience, and to deal with that experience in reasonably effective fashion. He acquires structures (devices, arrangements, ideas, or ways of thinking) that permit him, on occasion, to treat a number of experiences as if they did not differ from each other—as if they did not vary, as if they were invariant. Through assimilation, as we have seen, he treats almost any new experience as if it were identical (invariant) with some previous experience. In developing a modified structure, accommodation permits the attainment of larger and more trustworthy invariances.

Invariances are always organized around some limiting condition or some criterion. It is only *with respect to this feature*, or *under that condition*, that differences can safely or legitimately be ignored. It is only with respect to *swallowing* that milk and warm water can be regarded as identical or invariant. For other treatments (naming, ways of obtaining, quality of taste) the differences cannot be ignored.

As the child becomes older the invariances he achieves become more inclusive, and thus take care of larger areas of potential disequilibrium. They also become organized around more dependable criteria. At first these invariances are quite unconscious, and may consist of mechanical conditioned reflexes. Later, especially with the advent of language, they may become quite conscious and sophisticated and are sometimes stated in formal verbal or symbolic fashion. For the infant, it is a marvelous step when some blind, unwitting structures permit him to react to a footstep, or to the whiff of perfume, or to a humming sound, or to a shadow over his crib, all as undifferentiated signals of the approaching mother. With *respect to the mother's approach*, differences between these experiences can be ignored. In *this respect*, they are invariant. Much later, he will develop intellectual structures (concepts of number) which will permit him to realize that as far as *quantity* or *number is concerned,* these four apples, four pencils, four people, are invariant. As far as the *fourness* is concerned, differences between them can be ignored. With respect to other things, of course, these differences are important. Much later still, he may see, as far as the *forces at work* are concerned, that there is no difference between the tides, falling bodies, and the behavior of the planets. With *respect to these forces,* they are equal, identical, or invariant in their obedience to the same law. In other respects, their differences matter a great deal. In the *eyes of the law,* hopefully, all differences between people can be disregarded. In this respect there is invariance among people. In other respects those differences are important.

In the view of Piaget the intellectual progress of the child is similar to the record of human thought. The intellectual productions that have come down to us are largely part of the constant (invariant!) search for constancies. We continually seek that "which changeth not" in the midst of the "change and decay which all around we see." Following the urge for parsimony (see Chapter 4), we search for a very few constant principles, or rules, or slogans, or systems which will make sense out of the mass of confused observations with which we must deal. Piaget holds that the great, sublime, and inclusive invariances are to be found in the principles of mathematics and symbolic logic. These hold unvaryingly for all objects. Piaget thinks, moreover, that it is toward the principles encompassed by mathematics that the child, in his halting and groping intellectual development, inevitably moves.

Development by Stages

According to Piaget's theory, the child's intellectual life may be blocked off into *three* main stages (see Chapter 2). These are separated by transition periods, and within each of the main stages can be found a vast number of substages. There has been a certain amount of disagreement about the number of stages to be considered. We will speak of only *three stages,* each one marked by the attainment of a definite equilibrium. The term "period" will be used for the times of transition between stages.

Stage 1. Internalization of the Sensorimotor Schemata (0–2 years)

In this period, when language plays little part, there takes place the development and refinement of the linkages (schemata, or schemas) between sensation and action. These structures permit the child to react to the world as if it were a more orderly and dependable thing.

Preoperational Period (2–7 years). (Transition period spent in attaining the concrete operations.)

In this period there is little sustained equilibrium. Using his new linguistic power, the child wrestles with such abstractions as number and quantity, and the properties of classes.

Stage 2. Using Concrete Operations (7–11 years)

During this stage, the child uses principles, logical rules, relations, and the properties of classes. But he does this only when the principles or rules are clearly linked to some concrete examples.

Stage 3. Formal Operations (from 11 years on)

In this stage, rules and principles can be treated as real things apart from specific objects. The laws of logic now hold not only for concrete things but also for nonspecified things (x's), unreal things, or for imaginary things.

Stage One: Internalization of the Sensorimotor Schemata

During much of the first two years, language is either nonexistent or is limited to a halting exchange of names. To impose some order on his experience the infant must rely on a number of prelinguistic structures. These useful nonverbal structures are made up of sensorimotor linkages between the world of sensations, on the one hand, and the world of action, on the other. Piaget refers to such a link as a "sensori-motor schema." The term "schema" refers to anything that links, or organizes, or ties together. It means something like "arrangement." The plural of the term is either *schemas,* if you are a modernist, or *schemata,* if you insist on following classical Greek. You will come across both usages.

We have seen how these crude and inarticulate sensorimotor schemata—such as those used in swallowing—can be modified to reduce the number of separate things with which the child must deal. During the first two years, these sensorimotor schemata develop and become *internalized.* More and more, that is to say, they become the properties of the child himself. They become things, or structures, that the child can use even in the absence of the stimuli that originally brought them into being. In the same way, you yourself can contemplate, for a moment at least, the concept of *weight* without having to think of the many specific objects from which the concept developed.

Among other things, these sensorimotor schemata enable the child to act as if his many experiences came from definite objects in the outside world. And this, it will be remembered, is an important step in rendering that experience more orderly and manageable. Much is gained when the child's sensorimotor schemata permit him to treat the cat's repeated visits in the same way. A much greater step is taken, however, when some new structure enables him to experience these repeated visits, not just as similar events, or similar cats, but as due to one *real* cat who continues to exist even when out of sight. The child shows he has this structure when he strains to see the cat as it ceases to be a part of his sensory experience and disappears around the corner.

Some new structure permits the infant to experience the cat as a real object in the external world, and this structure paves the way for still other structures. A host of hitherto unrelated sensations—sight of the cat, touch of his fur, sound of purring—now become formed into a group. Because of this new structure, these different sensations can be experienced as equivalent or interchangeable representations of the cat.

The sensorimotor schemata give the child experience with many regularities or constancies in the world. He experiences *causality*, as when his push leads to the movement of an object. And in the sustained pursuit of the marble that eludes his fingers, he experiences something that corresponds to purpose. These primitive phenomena supply the basis for the starting points of many theories (Chapter 4). We must not imply that the child talks to himself about these things or verbalizes his achievements. These are prelinguistic structures, but they do tremendous things toward making the world more orderly and less formidable.

Piaget holds that these sensorimotor schemata also serve as the first *symbols* available to the child. At times, as we have suggested, these movement patterns become partially detached from the practical objects with which they deal. There are some schemata, for instance, that are involved in reaching for a rattle. The rattle and the reaching become intimately related. Every so often, however, the reaching takes place but no rattle is obtained. From this failure, the "reaching" schema becomes somewhat separated from the rattle. To the extent that this separation occurs, the schema can be brought into play even when there is no rattle present to initiate the reach. The act of reaching can thus become a crude neuromuscular symbol for the rattle. In the same way, the opening of the mouth can become a symbol for the absent bottle. With these fleshy symbols at his disposal, the child can engage in symbolic transactions with objects no longer present. Piaget believes that the infant gets great pleasure from the symbolic manipulation of the absent object. Certainly they enrich his experience and may well refine it.

The Equilibrium of Stage One The mastery of this first stage represents an amazing achievement for the two-year-old. This is probably as far as the ape or any other primate cousin will ever go. The human child, of course, still lacks the strength, the sturdiness, the bulk, and the agility necessary to get along in the world. Given the protection necessary to make good this deficit, however, his supply of sensorimotor schemata permits him remarkable success in dealing with the world that he experiences.

If it were not for language and other symbols, it is possible that this comfortable equilibrium of the first stage would continue. As the child moves more and more into the world that is dominated by language and symbols, however, the equilibrium begins to disappear. As a young infant, for instance, any food placed near him could be eaten. All food so placed could be treated in this invariant fashion. As his parents begin to hold him responsible for language, however, this invariance comes to be undependable. Some food near him can be now eaten; some cannot. This disequilibrium, and this confusion, can be corrected only when he can take language into account, and can distinguish between food that is accompanied by "No, No" and that which is accompanied by a verbal invitation. Upon mastering this system of symbols, he will achieve marvelous new invariances and enjoy their attendant equilibrium. Pushed by the disequilibria brought about by these linguistic complexities, he embarks on a long transition to more inclusive and more legitimate invariances, and through these, to a more dependable equilibrium.

Preoperational Period: Attaining the Concrete Operations

Between the ages of two and seven, approximately, the child is in the *preoperational period.* He will complete this period of transition and will attain a new equilibrium somewhere between the ages of seven and ten, when he has worked out the new structures called *concrete operations.*

The Problem of Classes Part of the preoperational period is spent in linking up the existing crude sensorimotor schemata with the more precise names or concepts made possible by language. During the preoperational period he will extend and refine his primitive process of classification heretofore based on the sensorimotor schemata. He will soon learn, for example, to place rectangular chips in one pile and circular chips in another. He will fairly consistently use the word "cat" for one set of objects, and "bird" for another. According to Piaget, however, he still has far to go before he experiences the class as a genuine concept or intellectual structure. To do this he must realize that the individual birds are really different individuals and not just the same bird coming back for repeated visits. He must also know that the individual birds differ in several respects, but that, for the purposes of *this concept* (the class of birds), these individual differences do not matter. Finally, when he encounters the word "bird" he should have some mental image of the general class of things to which the word applies. There must be something real (a structure, a concept, or an idea) in his intellectual life that corresponds to the general notion of "bird." The child must be able to react to some attribute of birds (e.g., flight plus feathers), must be able to separate this attribute from the particular bird, and must see that these attributes apply invariantly to a number of different individuals.

Mastery of classes does not come easy. Even after the child can visualize a class, in some fashion, he still has trouble in seeing its limits, and in seeing its relation to things outside the class. Sample discussion: "If I were making a collection of owls, could I add other birds to my collection?" "Yes." "Why?" "Well, owls are birds, too, aren't they?" Or: "Are there more owls or more birds?" "The same: Owls are birds." He has similar troubles with classes that include classes. He is shown a collection of wooden beads, for instance, of which a few are white but most are brown. "Are there more white beads or more brown beads?" "More brown." "More brown beads or more wooden beads?" "More brown." Apparently he is not perturbed by the suggestion that there could be more members of the subclass (brown) than of the main class (wooden). Part of his difficulty, however, may come from lack of precision in language. "More" may mean "something that impresses me a lot." And to the child, the disproportionate number of brown beads may stand out from its setting more conspicuously than does the general collection of wooden beads.

Along with his confusion between classes and subclasses, the preoperational child has difficulty in dealing with two systems of classifications at the same time. At one time he can decide whether a balloon is big or small. At another time he can decide whether it is red or blue. But he finds it hard to sort big red balloons into one category and small blue balloons into another. At any time that he is required to deal with two dimensions or two sets of attributes at the same time, he is likely to get one confused with the other. He can see an army general, for instance, as standing high on the attribute of power. Now he is required to deal with the attribute of ethics, and is asked if this man was wrong in giving secrets to the enemy. He may readily say, "No," and, when pressed, may justify his answer simply by saying, "Because he was the general." Being unable to keep the two systems of classification separate from each other, the child automatically permits the general's high status in one attribute (power) to determine his status in another attribute (ethical behavior).

Conservation of Attributes This matter of attributes, or properties, and their invariances gives much trouble to the preoperational child. It is difficult for him to see that number, for instance, is an attribute that can be separated from the particular objects to which it is applied. The child looks at a group of coins and then watches while someone scatters the coins over a wider area. He now thinks that there are more coins than before. Later on, during the first phases of the operational stage, this misconception will disappear. At that point the child will clearly realize that the number of objects is unaffected by the area they occupy. In the terms of Piaget he will achieve the *conservation of number*. The term *conservation*, of course, follows the physicists' idea of the conservation of energy, or the conservation of matter, and refers to the fact that the thing named (number, energy, matter) remains invariant in spite of differences in appearances. But this is to come later. During the preoperational period the child has not yet begun to conserve number, or to see it as something that can be invariant in spite of variations in physical appearance. In the same way, he fails to *conserve substance;* the same lump of clay is held to contain more material when spread out into a flat pancake than when rolled into a sausage. The *conservation of volume* proves most difficult of all. The child sees a cup of water poured into a short, squat glass. He then sees the *same cup* refilled and poured into a tall, slender glass. He contends that the latter has more water.

Egocentric Attitudes These misconceptions of the preoperational years are accompanied by, perhaps partially engendered by, a marked egocentric attitude. The child cannot see the objective world and its laws, on the one hand, as separate from his own wishes and desires, on the other. Even as adults, of course, we are not always entirely rigorous in this matter. Our very language invites a certain ambiguity. We use the same kind of language to ask, "Why does a dog turn around several times before lying down?" on the one hand, and to ask, "Why doesn't the dog come when I call him?" on the other. The first question deals with a purely cognitive matter. It calls for an explanation or a statement of general principles. The other question deals chiefly with frustrated wishes. The desired answer to these questions is not an explanation but an action—the penitent return of the wayward dog. This second, or egocentric, use of "why" is the

TUTE OF EDUCATION

The Effects of Age and Schooling on the Conservation of Quantity

Groups of six-year-olds and nine-year-olds were given 5 different tests to see if they had attained conservation of quantity. (Could they see that the number of objects remained unchanged even though the physical arrangement of the objects was altered?) Half of the six-year-olds and half of the nine-year-olds came from a district in which school had been shut down for the previous four years. The nine-year-olds from this district had thus been deprived of regular schooling. There were from 25 to 30 children in each of the four groupings.

	Percentage of Children Showing Conservation of Quantity (pooled results based on five different tests)	
	Six-year-olds	*Nine-year-olds*
Children from districts with no schooling	18%	64%
Children from districts with regular schools	8%	66%

The nine-year-olds with no schooling were ahead on two of the five comparisons. Those with regular schooling were ahead on three. None of the differences between the "schooled" and "unschooled" groups was significant.

SOURCE: E. Mermelstein and L. S. Shulman, Lack of formal schooling and the acquisition of conservation, *Child Development*, 1967, 38, 39–52.

one that the child most readily understands. With this in mind we can understand the behavior of a child who had been watching a small piece of wood floating in a tank. He was then shown a much larger (and thus heavier) piece of wood and asked if it would float or sink. He thought it would sink. After showing him that it floated, the demonstrator asked, "Why didn't it sink?" For answer, the child reached out and pushed the wood under the water!

Stage Two: Concrete Operations (ages seven or eight to ten or eleven)

About the time the American child enters elementary school he has begun to attain some success in problems that were too much for him during the preoperational period. When real objects are present he can think of some of their attributes as largely independent of the objects themselves. If there are ten beads, the "ten-ness" holds whether the beads are wood or glass, and holds even when we take away a blue bead and substitute a red one. The number of this particular group of beads is seen to remain constant or invariant no matter whether someone scatters them over a wide area or gathers them together in a compact bunch.

Dealing with Conservations and Classes As he works his way through this stage, the child attains the conservation of substance and still later, about the age of nine, he comes to conserve weight. He can see weight as an attribute that can be the same (invariant) for two substances differing markedly in appearance. Some time will elapse after this conservation of weight, however, before he can conserve volume. It is only toward the end of the elementary school that he sees that the volume of a given quantity of liquid remains invariant no matter whether it is poured into a shallow, broad glass or a tall, slender glass.

These conservations, when they come, by no means take the form of grudging, intellectual assent. They come, on the contrary, as something completely and utterly convincing. These new ways of thought are so obvious and so compellingly correct that the child refuses to believe that he once lacked them. To him it is inconceivable that either he, or his younger brother, ever thought that the number of objects present depended on the space they occupy. In the same way, adults refuse to believe their ears when they hear the older child state that the same glass of water yields more liquid when poured into a slender tube than when poured into a wider vessel.

In the mathematical theory that dominates Piaget's thought, the matter of *reversibility* is very important. And we can all see in a very general sort of way that the notion of reversibility is crucial if our intellectual operations are to maintain an equilibrium. To enjoy a genuine equilibrium, for instance, we must see that *when a certain criterion* (suckling the young) *governs our thoughts*, the class of birds must be kept separate from the class of mammals. When a different criterion (warm blooded) is invoked, however, this separation must be undone or reversed, and both birds and mammals included in the same class. Only when we are at home with these possibilities for reversal can we avoid chaos in this matter of higher-order classification.

During the stage of the concrete operations, the child comes to incorporate the notion of reversibility into more and more of the intellectual structures that he has worked out. In the preoperational period, for instance, he could make the chemical scales balance only by adding some weight to the lighter pan. If he added too much, he then added something to the other pan. During the stage of the concrete operations, however, he comes to see clearly and compellingly that, as far as the *effect* on balance is concerned, adding something to pan *A* is precisely the same as taking something away from pan *B*. The two operations are invariant with respect to this criterion.

During this stage, the child's mastery of classes increases markedly. Now if you ask him if there are more birds or more robins, he will answer correctly and with

Can a Special Training Program Accelerate the Conservation of Weight and Length?

From a pool of 86 boys and girls aged five and six years, approximately one-third were selected at random and assigned to a training group. The others were tested but given no training. All children were tested to see if they had attained conservation of weight. (Could they see that a ball of clay did not change its weight when its shape was altered?) The training group was then given specific training to help them understand (1) the meaning of terms like "heavier," "lighter," "equal," (2) the meaning of weight (as distinct from volume), (3) the way a weighing scale works, (4) the fact that a scale is more accurate than kinesthetic cues, (5) that adding clay to a lump makes it heavier, (6) (finally) that a change in the shape has no effect on weight. A similar program was arranged to teach conservation of length of lines. There were nine 20-minute training sessions in all. The trained children performed significantly better than the controls in both types of conservation.

SOURCE: R. C. Kingsley and V. C. Hall, Training conservation through the use of learning sets, *Child Development*, 1967, 38, 1111–1126.

complete conviction. If he hesitates at all it is only because the question, dealing with such an obvious matter, seems stupid and bewildering. For all his confident mastery of this operation, however, he may still have difficulty with the converse. He may have trouble, for instance, if you ask him, "Which would leave us the largest number of living things—destroying all the ants, or destroying all the insects?"

As these conservations and other structures take shape, they completely dominate the child's cognitive world. In all his thinking he confidently and unquestioningly acts as if these things are self-evidently true. Along with the acquisition of these basic operations, he gains a more refined comprehension of the more general mathematical and logical operations. More important, his intellectual world becomes organized around the invariances in these things. He sees that the action of gravity holds over a wide range of objects; that the population of *any* subclass never exceeds the population of the class of which it is a part.

Dependence on Concrete Particulars In mastering the stage of concrete operations, the near-adolescent has made marvelous strides, but he still has some distance to go. The principles and operations that now automatically control his thought processes are still bound to concrete particulars. He has not yet intimately absorbed these operations and these invariant mathematical or logical operations as disembodied entities in their own right. They constitute an intimate and convincing part of his experience only insofar as they apply to concrete particulars. The unknown x in the algebraic equation, it is true, can stand for many, many different things. But it must stand for *something*. Divorced from some concrete x, the operations of the equation are not yet a compelling influence. The relations between classes and subclasses, true enough, are convincingly seen as universal and invariant, but they are always pictured as applying to concrete things—to the subclass of robins in relation to the class of birds, to the subclass of hot dogs in relation to the class of meats, or in relation to the larger class of foods.

Achievements and Limitations Having absorbed these practical principles or concrete operations into the very makeup of his intellectual life, the school-age child has achieved another equilibrium or resting stage. And a very effective equilibrium it is. Most people, as a matter of fact, would probably do very well if they never moved away from this advanced stage of intellectual competence. Shortly after reaching this stage of cognitive organization—at about eleven years of age—the youth, especially the girl, will be propelled into adolescence and, under primitive conditions, might well undertake adult responsibilities with little more intellectual equipment than this stage provides. During early adolescence, as it happens, she will move beyond the equilibrium of this stage and will reach a new equilibrium, but even without this she could at least make a beginning in her adult life.

So satisfactory and so effective is this stage of the concrete operations, as a matter of fact, that many people have asked why it is that we are led to go beyond it. With an equilibrium so neat and so inclusive, what can come along to upset it? In discussing this mystery, Professor Bruner (1959) has suggested that it is the onset of adolescence, with its forceful stirrings, that call for developments beyond this comfortable equilibrium. Up to now, the adolescent has dealt with the present, and with existing particulars. In a primitive society, for instance, the preadolescent has satisfactorily mastered the complex patterns that govern existing kinship relations. He knows the position his own mother holds as a daughter-in-law within a larger household. He comprehends the complex rules and equations that govern her relationship to his father's brothers and to their wives. These rules, however, are intimately linked with the specific people he knows so well. Only when thus clothed with such familiar particulars do the rules become a natural and compelling part of his thinking. As he looks toward his own mating and to the future, however, he must apply these rules and sets of classes to situations and to particulars that he has never yet experienced. If he is to think about the future, these rules and systems of classification must become divorced from the particular people around which they are now organized. The system itself must become a free-floating entity. It must hold whether he himself occupies the position of son, or of husband, or of brother-in-law. In his intellectual makeup, the abstract system must remain invariant.

Stage Three: The Formal Operations (from early adolescence on)

For whatever reason, the cognitive structures of most people do come to include formal rules that govern logical relations. These rules come to control our intellectual operations quite apart from the particulars to which they may be applied. Automatically, compulsively, and with complete conviction, we reject the suggestion that the number of items in a subclass could exceed the number of items in the larger class of which it is a part. To be governed by this conviction we do not need to know whether the classes in question deal with vegetables, parts of speech, or mathematical notions. When our thought processes come to be controlled by these considerations, we have achieved the *Stage of the Formal Operations*. Here the word "formal" is used in the mathematical or philosophical sense. Plato, for instance, spoke of the "form" (of a tree) as the true essence of "treeness" quite apart from the concrete particulars of any one tree. Similarly, Piaget speaks of a formal operation (of logic) as an operation that is independent of the particular objects to which it is applied.

When these formal operations become compellingly incorporated into our ways of thinking, we are rewarded with a new order of invariance. Here we deal with things that are eternal and that apply invariantly to all items *in the field that they govern.* These rules form an integral part of our cognitive doings and hold indifferently whether we think about ships, or shoes, or sealing wax; whether, indeed, we think of nonexistent unicorns, or imagined electric particles, or nonexistent dimensions of space. When these formal structures really dominate our intellectual apparatus we can use them comfortably and fluently even in thinking about things we know to be contrary to fact. In the field of statistics, for instance, you can, with a little prodding, think about an "assumed mean" and treat it seriously, even though you know that probably it is a false mean. The young aerial navigator can make intricate and precise computations about a hypothetical "air position" in which he assumes that there is no wind, even though he knows all the time that there really is a wind, and that his air position corresponds to nothing real.

Piaget has often been accused of going too far in suggesting that the typical adult makes free and confident use of the glorious invariances to be found in the airy abstractions of advanced mathematics and formal logic. Like the "prose" that Molière's M. Jourdain discovered he had been using all these years, it is true these abstractions may be things that we automatically use without ever giving them their awesome technical names. In spite of the fact that we cannot describe them in any precise fashion, we may well have unwittingly absorbed these advanced notions into our intellectual structures. In considering some of the implications of this stage, however, many people may draw back and say, "He is not talking about me." It is probably a rare person, as a matter of fact, who can think confidently and seriously about a fifth dimension, or about "the class of all classes that contain no subclass," or some other entity for which he can find no comforting concrete counterpart. Few people ever rid themselves completely of the reassurance they experience when they see a convincing practical and familiar illustration of the abstract principle they are trying to understand. You yourself, for instance, in trying to master some complex and abstruse principle may often feel marked relief when, out of the corner of your eye, you detect a "for example," or "for instance," hovering about in the next sentence. This relief becomes more pronounced if the promised example really does turn out to be familiar, down to earth, and convincing.

However strong their continuing appeal, we do become partially weaned from our childish dependence on these comforting concrete particulars. As we do so, we attain the stage of the formal operations and develop truly adult cognitive structures. With these more mature structures we reach the third and final equilibrium. We can now deal with almost any new experience and can do so without being forced either to distort the new experience or to modify the structures themselves. These final cognitive structures, according to Piaget, closely resemble the rules of mathematical group theory and of symbolic logic. These, of course, are elegant and systematic descriptions of the great invariances by which, in some fields, formal science has tamed the chaotic flux of raw data. It is not surprising that Piaget sees these same invariances, however crudely and dimly envisaged, as the basic mental structures by which the developing individual has been able to digest and master the vast confusing flow of his own raw experience. To the avid seeker after order, this tidy parallel is too compelling to be ignored.

Measured Intelligence: The Abilities Involved

We turn now from Piaget's persuasive insights to the study of the testing instruments, a study carried on by the detailed, computer-straining computations used in factor analysis. Many psychologists have held that for all its vagueness intelligence is something we talk about, worry about, and try to make judgments about. Surely there must be something definite behind all this, if we could only put our hands on it.

In their attempts to "zero in" on the nature of intelligence, psychologists have wondered if the thing they were talking about is a single thing, an organized cluster of things, or a haphazard grab bag of many different things. Fortunately, we can get some leads in answering these questions even without a formal definition. The answers to these secondary questions, moreover, may help us to reach agreement about the nature of intelligence itself.

A Global Concept of Intelligence

In many studies of intelligence it has been assumed that we can safely come up with a single score. We can say, for instance, that George has an IQ of 118, or Sally has a standard score of 73. There are two quite different circumstances in which we might feel justified in using such a single score. We could do so in the first place if we thought that intelligence really was a single thing, like weight or age, which a person had a lot of, or only a little of. We might also seek to get a single score if we thought that intelligence was really made up of a great many quite separate things. Since it would be awkward to have to use (say) 5000 different scores, we might, for pure convenience, try to work out a single average.

Both these views have been advanced at one time or another. Early in the century, C. E. Spearman held that intelligence was a single thing, made up of the ability to see relations. True enough, this ability might not show itself to advantage in some areas, as when a tone-deaf man is called upon to see the relations between musical themes. Because of this problem, Spearman held that we should be sure to measure this single ability in a variety of ways. In the same way, a surveyor might use several different approaches to measure the height of a single mountain. In each of his measurements, the psychologist, like the surveyor, would be getting different estimates of a single thing. Spearman made much of the difference between the general factor (g) and the specific estimates (s). According to this view, intellectual development would occur as the child acquired more and more of this single entity.

Writing about the same time as Spearman, E. L. Thorndike advanced a rival view. He held that general intelligence was merely a totality of thousands of different abilities, or habits, or stimulus-response connections (see Chapter 4). Any single average we might use would represent a convenient way of describing the totality of these many separate abilities. As the child developed and obtained a higher score, this could mean either that he had developed some new abilities or had acquired greater skill in old ones, or that both kinds of improvement had occurred.

Age Scores: Values and Limitations The first really useful scale of intelligence was developed by Alfred Binet, also working early in the century. Without taking a strong position on the argument between Spearman and Thorndike, Binet considered intelligence to be made up of a few central things like judgment and ability to reason. He realized, however, that his actual scale seemed to call on a great many different abilities. He worked out a single index largely for convenience, and to aid in administrative decisions.

To get a single index Binet scored the tasks in his test by assigning each an appropriate age level. In the task of defining words, for instance, the child being tested might do as well as the typical six-year-old. In following directions, he might equal the typical eight-year-old. Averaging these and other scores, we might be able to say that *in general*, this child performs at the seven-year-level. Such age scores made the test tremendously useful and appealing. This procedure also made it easy to compare any one child to the average for the group, or to compare one whole subgroup of children to the average of a larger group.

Changes and Constancies with Age Useful as they were for practical purposes, these age scores made for complications in the matter of providing a *general* picture of intellectual development. Obviously at age four, children *in general* would do as well as the average child of four! At age six, they would do as well as the average six-year-old. Using a great deal of statistical ingenuity, however, some psychologists have seemed to break out of this tautological circle and to work out absolute scores—comparable to inches or pounds—for the results of the Binet-type tests. Two of these, using different statistical techniques, appear in Figure 3.1.

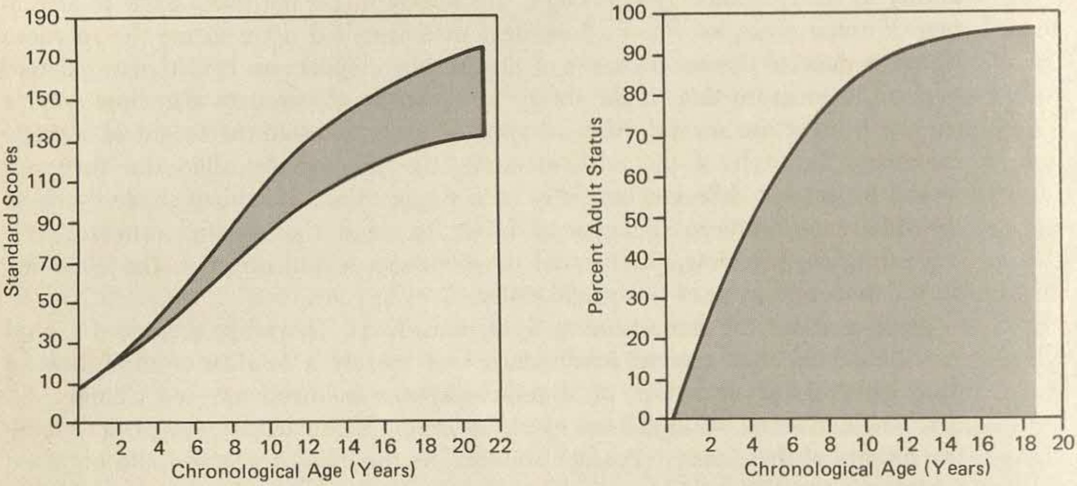


Figure 3.1. Growth in intelligence expressed (a) as standard scores and (b) as percentage of adult attainment. Redrawn by permission from N. Bayley, *American Psychologist*, 1955, **10**, 811, and L. H. Stott, *Child Development* (New York: Holt, Rinehart and Winston, 1967), p. 173.

These two graphs show some agreement with each other, and both are similar in some respects to the growth curves for height. Both graphs show a rapid increase prior to age ten or twelve, and a slower rate thereafter. One of the graphs for intellect shows a tremendous spurt in the early years, but this very early spurt is not brought out by the other method of measuring.

The shaded portion of the graph in Figure 3.1 shows that individual differences become greater as children grow older. At the age of six, for instance, some children will perform as well as the typical eight-year-old, whereas others will fall to the four-year level (Symonds, 1960). By the age of fourteen the comparable range will extend over eight years, some of the fourteen-year-olds performing at the ten-year level, others equaling the typical eighteen-year-old.

When intellectual development is studied in this global fashion we also find a great deal of consistency, especially in the later years (Bloom, 1964; Bayley, 1949). There is a correlation (see the Appendix, pp. 648–658) of about .80 between the score a pupil gets at age ten and the score he gets at age eighteen. We could use test results obtained by a child in elementary school as a rough estimate of the score he will get at college entrance. In early childhood, however, no such stability appears. Tests taken during infancy have little relation to later performance. By the age of two or so some stability does begin to appear, but even at this age it would be unwise to use a single test score to estimate future performance.

The Stability of Intelligence from Childhood to Middle Age

Some 48 people who had taken an intelligence test in preschool were retested at various times during the next 38 years. The same test, or a similar test, was used on each occasion.

	Dates of Taking the Test			
	1931	*1941*	*1956*	*1969*
Average age	4.1	13.8	29.7	41.6
Average IQ	110.7	113.3	124.1	130.1
Correlation with 1969 IQ	.41	.68	.77	

SOURCE: J. Kangas and K. Bradway, Intelligence at middle age: A thirty-eight-year follow-up, *Developmental Psychology,* 1971, **5**, 333–337.

We must be careful, of course, not to read too much into this stability or lack of stability. We should not regard this relative stability, for instance, as evidence that intelligence—the kind of intelligence that tests measure—is an inborn, fixed thing. Such stability could just as well reflect the typical stability in the environment to which children are exposed. On the average, a child who lives in an intellectually stimulating home at the age of four may also be the child who lives in a stimulating home at the age of twelve. In trying to get at the vexatious problem of genetic influences on intelligence (see later) we should rely on evidence that is much less ambiguous.

A Cluster of Separate Factors

After many attempts to see whether intelligence should be regarded as a unitary thing, on the one hand, or as a vast number of unrelated things, on the other, many psychologists at one time came to believe that intelligence, as measured by our tests, is made up of fewer than a dozen separate factors or components. Each of these factors of intelligence could be regarded as a unitary thing. But the factors themselves were assumed to represent abilities that are quite distinct from one another. The best known proposal was that of Thurstone (1938, 1955). Using the technique of factor analysis, Thurstone found seven major groups of tests, each group seeming to overlap very little with any other group. He assumed that a separate factor was involved in each group. These suggested factors dealt with such things as perceptual speed (finding a certain word in a page of print), reasoning, verbal comprehension (vocabulary), word fluency (quickly coming up with the right word), dealing with space, dealing with numbers, and rote memory.

Going by this view, a psychometrist could no longer give an adequate description of a student's intelligence by using one single number but, instead, would have to give him seven different scores. The student's score on one of these factors, moreover, would not be a good indication of his score on the other six. In the same way, the course of intellectual development would be shown, not by a single graph, but by seven separate graphs. In Figure 3.2, we see such graphs for four of Thurstone's factors—perceptual speed, reasoning, vocabulary, and word fluency. Like the first graph in Figure 3.1, these curves do not show rapid growth prior to the age of four or so. Notice also that at age eighteen the individual has almost reached maximum proficiency in perceptual speed, but only about 70 percent of his ultimate proficiency in the fluent use of words.

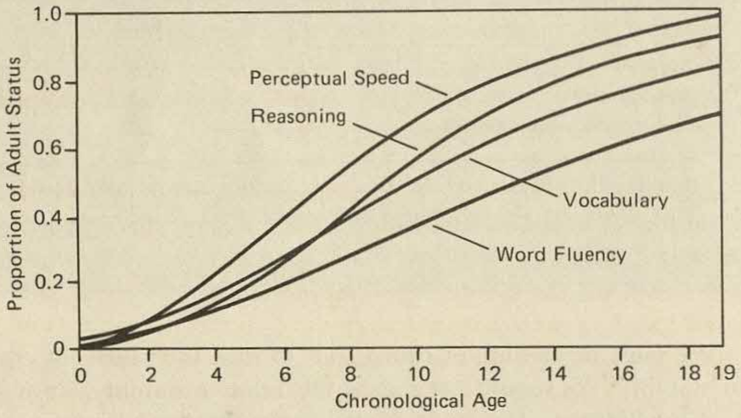


Figure 3.2. Growth in four of Thurstone's Factors of Intelligence. Redrawn by permission from Thurstone (1955).

This factor-analysis approach suggests that the course of development is different for different areas. This approach also suggests that intellectual deterioration, when it sets in, is similarly different for different factors. This facet of deterioration, or "reverse" development, of course, may be of less significance for teachers of the young, but it is interesting to note that vocabulary shows little loss before the age of 50, and only a slow decline thereafter. Ability in numerical reasoning, however, begins to decline after 30 and shows appreciable loss (as much as 30 percent) by age 60 or 70.

Three-Dimensional Structure

As the factor analysts examined more and more tests of human abilities they found evidence for an ever-growing number of factors. It also happened that even when examining somewhat similar tests, different investigators came out with different sets of factors. This inconsistency, coupled with the large and growing number of factors, presented a most confusing picture.

In the list of Thurstone's seven factors, it is clear that some of the factors are described in terms of the material or *content* involved. Some factors, for instance, ask you to deal with space, others with numbers, or with isolated words. Other factors are described, however, not in terms of the content, but in terms of the *operations* you perform on this content. One factor, for instance, asks you to *remember* words. Another asks you to *reason* about words. Both of these factors involve words as the content, but each calls for different operations. Factors may differ, moreover, in the *products* that are required. In using the factor of perceptual speed you are asked to produce or detect a *single word* that is already on the page. In some reasoning tasks (e.g., hammer:nail as bat: ______) the product, or the thing you have to see, is the *relation* between hammer and nail. Using this newly derived relation, and the given word "bat," you must now produce a *new word* that has not been presented to you.

Integrating the Separate Factors Impressed by these three different sorts of things used to differentiate the factors, and by the vast number of factors proposed, Guilford (1956, 1959, 1967) suggested a single three-dimensional model to include all the factors already mentioned, and going still further, to suggest others that might yet be discovered. In this latter sense Guilford's model resembled the classic periodic table of chemistry. In this model (Fig. 3.3) each dimension represents one of the three different kinds of things the factors stress: contents (words, space, etc.); operations (perceiving, remembering, reasoning, etc.); and products (units, relations, etc.). These three dimensions represent the important attributes of any task you face. In any task you deal with a certain kind of material (content); you are required to work on it in a certain way (operation); and you are supposed to achieve some outcome (product). There are four kinds of content. If you are asked to see the window in the room, you are dealing with *figural* content. You are concerned with the window as the thing itself—not as a symbol for something else, but merely a window as a window. In *symbolic* content you see marks (SMEK, for instance), or hear noises that stand for something else. At this point you do not need to know what the marks stand for. Without knowing what it meant, you could see the symbol SMEK, could remember it, and could even compare it with another equally meaningless symbol. In *semantic* content, the symbols do have meanings, and the meanings are the things you are asked to deal with. *Behavioral* content is a sort of leftover, and has not been worked out as precisely as the others. It refers to the acts of others, particularly to acts that have some social impact.

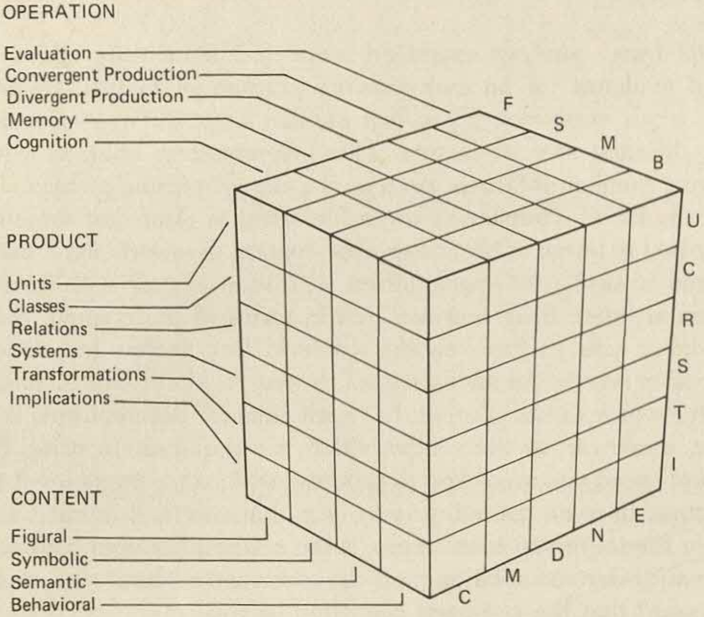


Figure 3.3. From J. P. Guilford, The Nature of Human Intelligence. Copyright © 1967 by McGraw-Hill Book Company, Inc. Used with the permission of McGraw-Hill Book Company.

Operations and Contents Dealing with any kind of content you could be asked to perform different operations. You could be asked to perform the operation of *cognition*—to be aware of the window, or the symbol SMEK; to *remember* these things; to suggest many different kinds of windows (*divergent production*); to see a window that would fit a particular opening (*convergent production*—only one size would do); or to judge (or *evaluate*) whether the window is large or small, attractive or ugly.

Contents and Products In your different dealings with different contents, you will come up with various *kinds of products*, and these have been spaced along the third of the three dimensions. In the area of semantic content, for example, you could remember the single number "3" (*unit*), or a *class* of numbers (odd numbers), or a *relation* between two or more numbers (6 is twice 3), or a system of numbers (3, 6, 9, 12 . . . . . .), or a modification or *transformation* of a number (from 3 you could get the reciprocal ⅓), or an *implication* of the nature of a given number ("three-ness—trinity—permits more pairings than "two-ness"). Similarly, in applying the operation of cognition to the area of figural content, you could be aware of a unit (a single chair); class of (kitchen) chairs; a relation between two or more chairs (larger, stronger); a system or family of chairs (different sizes all conforming to same design); possible transformations (chair hung from the ceiling); or implications (installing this chair would mean getting rid of three others).

Structure of the Intellect and Its Significance Since there are four contents, five operations, and six kinds of products, we could have a total of 120 separate abilities, and Guilford and his students claim that they have already identified over 100 of these. If we had to deal with each of these 120 factors separately and on its own, we would still be faced with intolerable confusion. By suggesting this compact picture of the structure of the intellect (SI), however, Guilford has made it possible to locate each of these cells within a framework of only three meaningful dimensions. In the same way, by knowing the longitude, latitude, and altitude of any city we can quickly, and meaningfully, locate it on the globe. Instead of having to remember the attributes of each of 120 cells, we can derive those attributes as soon as we locate it within the three-dimensional framework.

A knowledge of Guilford's structure of the intellect is necessary to round out the various views of intelligence. As yet, however, we cannot be very explicit about its bearing on the study of intellectual development. At one frightening extreme, the theory could mean that we would have to plot 120 separate graphs of development. And Guilford himself (1967) does briefly link general studies of development with growth in each separate cell. It is more likely, however, that more general developmental questions will predominate. As one of these more general questions, we might ask: how does the intellectual structure (SI) itself change during the course of development? Does the child start out, as Garrett (1946) maintained, with one single general ability? And does he then proceed to acquire finer and finer differentiations? Is it with age, for instance, that memory ability comes to differ from reasoning ability? Or does the child have the framework for separate abilities from the very first? Or is it possible that, at first, he is restricted to a few aspects of each dimension, and only later does he acquire the other aspects? Guilford speculates, for instance, that in the content dimension, the child first acquires some skill in dealing with behavioral content—the physical activities of those around him—and then later comes to deal with the figural world, and still later with the world of symbols and meanings.

Although the implications for development may be obscure, some of the implications for education, residing in the structure of the intellect, are already quite pronounced. Guilford's structure provides a neat way of contrasting abilities traditionally stressed by the school, on the one hand, with the abilities receiving little classroom attention, on the other. In the field of content, for instance, the school has given chief attention to two areas (semantic and symbolic), and has had less to say about the other two (figural and behavioral). Of the five operations, moreover, three (cognition, memory, and convergent production) have traditionally received much stress in the school, whereas the other two (divergent production and evaluation) have been subject to relative neglect. Of the six products, on the other hand, we find that all are invoked at one time or another, although many critics bewail the disproportionate attention given to units and classes. Guilford's theories have helped to focus attention on the operation of divergent production and the part it plays in the creative activities. These creative activities are discussed later (Chapter 8) when we consider the higher uses of the intellect.

Fluid versus Crystallized Intelligence

While Guilford was attempting to fit the various factors of intelligence into a compact structure, other psychologists (Horn, 1968; Cattell, 1963) turned their attention to some of the aspects that any factor must have. Thinking of Spearman's general factor, for instance, R. B. Cattell (1963) has held that this is not a single thing as Spearman thought but is made up of both a fluid component and a crystallized component. Fluid intelligence is most closely linked with the general notion of brightness. A person highly endowed with the fluid intelligence could turn his attention to almost any area—the mastery of Chinese or of English; the mastery of a binary number system, the decimal system, or a system to the base of seven. This fluid general ability probably reaches its maximum by the age of sixteen or so. Whenever the fluid intelligence is applied to any area, however, it produces specific or particular abilities—the ability to add 7 and 5 within the decimal numerical system. Some of these specific achievements remain with us. At any given time these remaining specific items constitute our crystallized intelligence. Obviously, this crystallized intelligence is closely linked to the culture to which one is exposed, and it represents achievement in the tasks of that culture. This intelligence can keep on growing well into maturity as the individual learns new English words or gains speed in numerical computation. When we turn to tasks in a new culture (a foreign language or the binary number system) this culture-bound crystallized intelligence may help us or may get in our way, depending on the kind of transfer that is involved (Chapter 9). Unlike fluid intelligence, it is not free-floating energy that can be directed to any task.

Conceptual Tempo

When faced with a problem or complex situation a child could either blurt out the first idea that came into his head or spend a good deal of time in thinking about each possible idea before he announced it, or before taking any overt step. This is the reflection—impulsivity dimension (Kagan, 1965) represented by the indecisive Hamlet at one extreme and the quick-firing Harry Hotspur at the other. Most people fall somewhere between the extremes. A child's standing in this tempo is part of a larger pattern. A child with an impulsive tempo, for instance, may also be more adventurous and more fidgety. The highly reflective child, on the other hand, has a longer attention span and is less subject to distraction. He is more persistent when facing a difficult task. He makes fewer responses and certainly comes up with fewer errors. He is better able to control nervous squirming and drumming (Meichenbaum and Goodman, 1969). He tends to avoid undertakings in which there is a high risk of failure or of looking foolish (Reppucci, 1970; Siegelman, 1969; Kagan, 1965).

We must not assume that being reflective is the same thing as being intelligent. Tempo and general intelligence are not closely related. Two children might be equally bright and yet one might be impulsive and the other reflective. With some kinds of material, the impulsive child would show off to better advantage. Some material, for instance, is fairly straightforward and there is only a moderate likelihood of error. Here the impulsive child, with his rapid volley of responses, gets a higher score. His more reflective classmate actually wastes much time in mulling over answers that do not require so much attention. When the material is tricky, however, and when there is great chance of error, the reflective child will seem the more capable. Many stupid answers may occur to him, but in keeping most of these to himself he will look better to the outsider. More important, in suppressing his first guesses for a time, he has a better chance of seeing a second and more adequate possibility that may escape the more impulsive child who has already committed himself.

Tempo and Success in Different Tasks

One test—the Children's Association Responding Test (Achenbach, 1970a)—is designed to find out if the pupil will accept the very first idea to occur to him. The child, for instance, reads a test item such as: "Pig is to wild boar as dog is to . . . . ?" Because of routine association, the first word to occur to many children would be "cat." The impulsive child is likely to blurt out this first association. The reflective child is also quite likely to entertain this first association. But since he is inclined to examine any idea before committing himself to it, he is more likely to hesitate long enough to see that "cat" is wrong, and to see the need for a better answer (wolf). In general, the child who takes a second look at the first association that occurs to him will get along better in many kinds of schoolwork (Achenbach, 1970b; Messer, 1970). Often, in schoolwork there is a high risk of error. In revealing his early (and erroneous) ideas for all the world to see, the impulsive child is likely to be accused of "just guessing." By keeping his first guesses to himself and subjecting them to further scrutiny, the reflective child acquires a more favorable reputation.

In dealing with ideas, you can often say a response to yourself and think about it before saying it out loud. In other kinds of learning, however, this may not be possible. In learning to swim, for instance, or in learning to pronounce foreign words, you must often make the actual response and take the consequences. In these tasks, the impulsive child may do better than his reflective classmate who refuses to "guess" and who shrinks from possible embarrassment. In ordinary social interaction, moreover, it is not surprising that the more venturesome, impulsive child, with his greater spontaneity and greater relish for social matters, may enjoy a richer experience (Kagan, 1965).

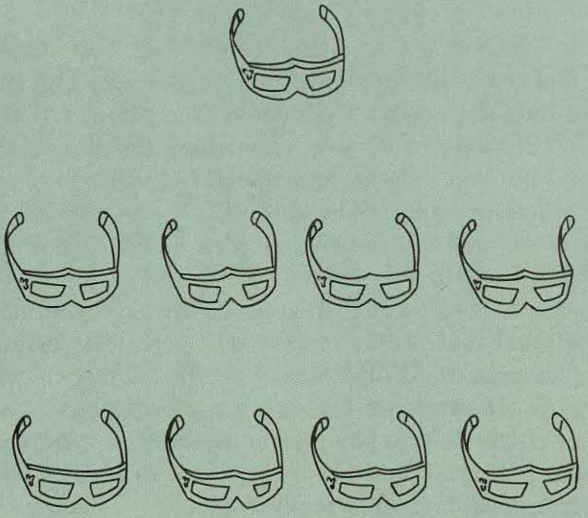
Changes and Constancies in Tempo

Whatever a child's conceptual tempo, it seems to be a consistent characteristic for him. If he is impulsive in one task he is also likely to be impulsive in others (Kagan, 1965). It would be safe to say that one child is reflective in general, whereas another child is impulsive in general, and a third shows a consistent tendency to be midway between these extremes.

As children grow older they tend, on the average, to become somewhat more reflective (Drake, 1970; Kagan, 1965). Some of this change may come from direct tuition (Kagan, Pearson, and Welch, 1966) or from the models to which they are exposed (Baird and Bee, 1969; Yando and Kagan, 1968). Some of it may

Do Pupils Adopt Their Teacher's Conceptual Tempo?

Conceptual tempo was determined by the time taken to respond to the Matching Familiar Figures Test, illustrated below.



From Regina M. Yando and Jerome Kagan, The effect of teacher tempo on the child, *Child Development*, 1968, **39**, Fig. 1, p. 29. Used with the permission of The Society for Research in Child Development, Inc.

In this test the subject examines the upper figure and then selects the best match from the remaining figures. In the adult test there are 12 such tasks. For children, there are 10 tasks and each one presents only 6 alternatives.

First-grade teachers (43 women in all) took the adult version and were scored on (a) time taken to respond, and (b) number of errors. Those with fewest errors (average 2.6) and longest response times (average 60.9 seconds) were classified as *reflective*. Those with the most errors (average 7.8) and shortest response times (15.7 seconds) were classified as *impulsive*. Ten of each of these groups participated in the experiment throughout the year.

From the class of each of these 20 teachers, 4 pupils were given the children's version of the test in the fall and again (different form) at the end of the year. For the children, response times were used to indicate conceptual tempo.

Changes in Response Times during the Year on the Part of Boys and Girls Taught by Different Categories of Teachers

	Teacher's Experience							
	8 Years or More				*Less Than 8 Years*			
	Boys		*Girls*		*Boys*		*Girls*	
	Score in Fall	*Change*	*Score in Fall*	*Change*	*Score in Fall*	*Change*	*Score in Fall*	*Change*
Teacher Classified as:								
Reflective	7.7	+ 10.9	8.5	+ 6.5	8.0	+ 2.6	8.8	+ 3.3
Impulsive	11.0	− 0.4	7.6	+ 3.0	8.3	+ 3.8	8.8	+ 2.9

With one exception, the changes show that response times increased during the year.

For more experienced teachers there was more change for the reflective than for the impulsive teachers.

Note that the experienced impulsive teachers started out with boys who had exceptionally long response times to begin with (11.0). Because of the regression effect, it would be difficult to increase these scores.

Combining all results, change for the reflective teachers was significantly greater than that for the impulsive teachers.

SOURCE: Regina M. Yando and Jerome Kagan, The effect of teacher tempo on the child, *Child Development*, 1968, **39**, 27–34.

come from the child's growing sensitivity to the claims of abstract relationships and to the many alternative responses that such relationships may suggest.

It is true that a group of growing children will move toward the more reflective range of the scale. Any one child, however, will tend to retain his relative status within this moving group. If he is more impulsive than the average as a six-year-old, he will differ from the average in the same direction as a ten-year-old.

Both he, and the group as a whole, of course, will be more reflective. This is very much like the continuity seen in other aspects of development. We must not make too much of this constancy. We should realize that it is far from perfect. We should also remember that it could come from any one of several causes (Mischel, 1969). Finally, there is some evidence that although, like physical stature, it tends to follow a steady path when left alone, it can be modified to some extent by deliberate efforts to that end (Baird and Bee, 1969).

Classroom Implications

This matter of conceptual tempo may present problems to the teacher (Kagan, 1965). It is often difficult to realize that the reflective child is *thinking* of as many answers as his more agile classmate, but he is merely refusing to announce his answers until he has examined them. On the other hand, we may condemn the impulsive child for thoughtless guessing when, in reality, he is merely being more open about the guesses that do occur to him. The reflective child makes the same farfetched guesses but keeps more of them to himself. At times—as when taking an examination—this temporary secretiveness may help. At other times—when we are trying to diagnose his difficulties—it may be a nuisance to the examiners. Finally, for success in some tasks, the teacher must try to get the same pupil to switch back and forth—at one time to strive for an impulsive tempo and at another time to try to be critical and reflective. In problem solving and critical thinking, for instance, it is most important to take a questioning look at first impulses. Creative enterprises, however, present a different problem. In these areas it is sometimes better if even the weirdest impulses were taken seriously for a time. The areas of problem solving, critical thinking, and creative thinking are discussed in Chapter 8.

Background Factors and Intelligence

As pointed out earlier, children vary enormously in their rate of development and in the level of development they ultimately reach. Many of these differences are somewhat linked to the child's background—to the general social class from which he comes (Tyler, 1965), to his nationality or race (Dreger and Miller, 1968), to his health and his record of illness, or physical defect (Jensen, 1969), to the occupation and education of his parents, and to the use of language within the home. This list could be extended to include size of family, position in the family, or number of adults sharing the home.

Worries About the Issues Involved

Some psychologists would hold that you should not have to bother about background factors, and there is much reason in their claim. First of all, many of these background factors seem to be a matter of differences in *averages*. It is only on the average that ghetto children fall behind their more favored classmates. Some ghetto children are very bright and the occasional child of well-educated parents will turn out to be dull. In trying to decide about the abilities of the individual child (Chapter 10) you should forget about his social class and his home background and look at the child himself.

In the second place, many of these background factors are largely beyond your control. In teaching Mary on Tuesday at 10 A.M., you must deal with the person she is at that time. You can do little about her genes, about the fact of her premature birth, about her history of lead poisoning, or about the linguistic practices within her home. In the long run, it is true, you or society may seek to improve some of these factors, but in most of your moment-by-moment teaching you must take the child as you find her.

Going still further, a number of people would say that in advertising these background factors, and certainly by dwelling on them, or stressing them, you may do much harm. To speak of the intellectual inferiority of a certain group is likely to bring about humiliation, and may also induce resignation or violent resentment, or both. To keep these factors and their influence in the forefront of your own mind, moreover, may tempt you to find a comfortable excuse for the poor achievement of your pupils, and may reduce your expectations for the less favored groups. Some of the information could lead to defeatism or fatalism. If you are so inclined to begin with, you may find support for a patronizing "what-can-you-expect?" attitude.

These reasons that are offered for saying little or nothing about background factors are held to be most important when the factor being considered is heredity. Heredity is clearly a matter of averages. Children from the same parents can vary widely in intelligence. There is little, moreover, that you can do about heredity. It is only since the early 1970s that scientists have seriously considered the possibility of direct genetic manipulation, and even if this does become feasible, people may well recoil from its use, just as they recoiled from earlier thoughts of selective breeding. Finally, the suggestion of genetic inferiority in intellect seems to be offensive to many people and likely to lead to unwholesome emotional reactions. Altogether, it is not surprising that some scholars worry about excessive concern over background factors, and that these scholars protest most vigorously when heredity is the background factor being considered (Klineberg, 1971; SPSSI, 1969).

There are dangers in the stressing of background factors and these are not to be ignored nor minimized. Even in the face of these dangers, however, there are still persuasive reasons for taking a quiet and objective look at the important factors that are largely beyond the control of the teacher. The teacher is not only a practitioner. He is also a thinker or theorist. He is bound to feel some curiosity about these matters and to give them some thought. These powerful background forces, moreover, are always at work while the teacher is applying his efforts, and the thoughtful teacher will wish to know about these forces with which his own efforts must interact.

Background Factors, Intelligence, and Cognitive Style

One group of 16 boys and 16 girls was randomly selected from a preschool in a middle-upper-class community, and other groups of boys and girls were similarly selected from lower socioeconomic groups.

	Mean Scores for Each Group	
Tests	*Low SES*	*Middle-Upper*
General Intelligence (Stanford-Binet)	92.0	122.6
Impulsivity (*errors* in matching familiar figures)	30.0	24.5
Memorizing Pairs of Words (*errors*)	39.6	18.5
Perceptual Skill (*Errors* in finding embedded figures)	19.8	17.4
Time spent in manipulating toys and other objects	48.3	23.4

The differences in these scores were all statistically significant. Differences in the following tests were not significant:

Number of contacts made in manipulating objects.

Inhibiting movements (fiddling, etc.) that interfere with the main task.

SOURCE: C. C. Mumbauer and J. O. Miller, Socioeconomic background and cognitive functioning in preschool children, *Child Development*, 1970, 41, 471–480.

Finally, the teacher is in a special position to be aware of the impact of these background forces, and he, more than most citizens, may wish to do some serious thinking about the social intervention that may be effective and feasible. All in all, it seems clear that in spite of the risks you should take a brief look at the more important background factors that have been studied. It is best to consider each factor as a possibility, or as an hypothesis, which, if true, would account for some of the observed facts of intellectual change. Some of these hypotheses would account for the changes observed in the individual child as he develops. Some would account for observed differences between groups. Some would do both.

Each of these proposed factors is still being examined. If you are comfortably established in Piaget's stage of the formal operations, and if you have a reasonable tolerance for uncertainty, you may be able to visualize the situation as a cluster of possibilities. Like a conscientious detective, you should see several "suspects." It is possible, but in this case highly improbable, that one of these hypotheses or suspects is completely responsible for everything that happens and the others play no part at all. It is possible that two or more of the suggested factors play some part and the others are merely incidental. It is possible that all are involved. Until you can get some evidence you should refrain from a hard-and-fast decision. And certainly you should refrain from a decision based chiefly on hopes or preferences.

Test Favoritism

Tests of intelligence (see Chapter 10) are based on the assumption that any child being tested will have had enough experience with the materials in the test to permit a reasonable mastery. When a child does not do as well as expected, it is always possible that he lacks some of the experience that is taken for granted.

This hypothesis has been advanced chiefly to account for social-class differences, or other group differences in test performance. The typical intelligence

Using "Black Dialect" To Test Black Children

Four-year-old black children were given the Stanford-Binet Intelligence Scale administered by a black examiner. For 50 children the test was administered in standard English. For the other 50, the language used was a "black dialect" familiar to the children and the examiner. For both groups, half (25 each) were praised for a right answer, the other half were given candy.

Average IQ for Groups Tested under Different Conditions

	Reward	
Language Used	*Praise*	*Candy*
Standard English	95.8	96.2
Black Dialect	97.1	95.4

No difference was statistically significant.

There is a *suggestion* that black dialect may help in general and that this advantage is washed out by the introduction of candy. This *interaction*, however, turned out not to be significant.

SOURCE: Lorene C. Quay, Language dialect, reinforcement, and the intelligence test performance of Negro children, *Child Development*, 1971, **42**, 5–15.

test, after all, is constructed by people who are white, middle class, and college graduates. With the best of intentions they may have included items that would be easy for children of their own group but strange and difficult for children of other cultures.

This has proved to be a difficult hypothesis to test. Many investigators have constructed tests which they hoped would be free from bias. So far, however, lower-class children fall behind on these new tests also, and fall behind just as far. But does this mean that test bias has no influence? Or merely that, in spite of his efforts, the investigator really failed to get rid of the bias? Obviously this will be a difficult problem to resolve.

Environmental Stimulation

There is much evidence to show that the environment has a pronounced effect on intelligence test scores (Tyler, 1965; Bloom, 1964). Negro children who migrated from the South to the schools of Philadelphia were found to move closer and closer to the white average as they spent more years in the northern schools. Children who moved to Philadelphia at an early age had an IQ of 86 in grade one, but boosted their score to 93 at the end of grade six (Lee, 1951). In other investigations, dull children who are given intensive treatment ordinarily show some improvement in intelligence (Bloom, 1964).

For additional evidence about the influence of environment we turn to those much-mentioned organisms in the arguments about heredity and environment—identical twins. Identical twins reared together serve as all-purpose, natural "experiments" and they turn up in many discussions. They have identical heredities and typically share remarkably similar experiences. When compared to fraternal twins they help us determine the influence of heredity (see later), since fraternal twins also share similar experiences but are not nearly so much alike in heredity. When compared to identical twins reared apart, these versatile workhorses also provide evidence for the influence of environment. Identical twins, separated at an early age and reared apart, true enough, are still quite similar in intelligence, as indicated by a typical correlation of .75. This is markedly less, however, than the correlation of .87 for identical twins reared together (Erlenmeyer-Kimling and Jarvik, 1963).

Environmental stimulation, which clearly plays a part in the development of the individual, can also be used as one factor to account for the observed differences between children from different groups. As we pointed out in Chapter 2, intellectual and linguistic stimulation of the ghetto child is often at a low level, and this could readily account for much of the intellectual difference that is reported.

We must not expect, of course, that all kinds of environmental stimulation are equally effective at all times. According to the stage theory such stimulation might be ineffective if applied too early, and equally useless if applied too late. Much of the evidence, but not all of it, suggests that it is difficult to hasten a child's mastery of any one Piaget stage by elaborate instruction. We find similar suggestions of pessimism from Head Start and other attempts to provide enriched stimulation for the ghetto child. Some scholars hold that this program, as a whole, has been ineffective, and at one time there was much talk about the "failure of compensatory education" as if such a failure were an accepted fact of common knowledge (Evans, 1971). As one explanation of this alleged failure, it has been suggested that the enrichment came too late in the life of the child. Other scholars, of course, deny any such overall failure and point to many successes among the cluster of disappointments.

Physical Defect

There is considerable evidence that a number of physical factors have a harmful effect on intelligence, especially on the intelligence of the young child (Jensen, 1969; Kagan, 1969). Such unfortunate factors include complications of pregnancy, premature birth, abnormal birth conditions, undernourishment, and chemical invasion, such as lead poisoning. Since these conditions are much more likely to be found in less fortunate homes, they can be used to account for some of the reported differences in the intellectual performance of various groups.

Genetic Influences

Heredity, as we have pointed out, is a delicate and contentious issue. Many people are upset over the suggestion that the genes play a significant role in the intellectual development of any one child. And the offense is greatly compounded when this hypothesis is applied to group differences.

There is also a fear that to admit any genetic influence whatever is to deny the possibility that there may be an environmental effect. This "either-or" attitude is most unfortunate. To show that the genes have an important effect is in no way to deny that the environment also plays a part. To a man developing new bloodlines of dogs or horses, for instance, there could be no question of the importance of genetic influences. Yet such a man would be amazed if anyone doubted that feeding and nurture also play a part in the development of an animal once conceived.

Information about the genetic factors in human beings comes largely from the study of similarities between different kinds of relatives. Identical twins, mentioned earlier in the study of environment, are also used in the study of heredity. There is as much intellectual similarity between a pair of identical twins as there is between two tests given to the same person. In many separate investigations, the correlation of similarity seldom falls below .80, and averages out at .87 (Erlenmeyer-Kimling and Jarvik, 1963). This remarkable similarity, of course, could come either from the fact that identical twins have identical genes or from the fact that, ordinarily, they grow up in an exceptionally similar environment. But same-sex fraternal twins also grow up in an exceptionally similar environment, and yet their intellectual resemblance is only .50 or so. This is no greater than the resemblance of two brothers or sisters born at different times. It is possible, of course, that the greater intellectual resemblance of identical twins comes from the fact that they are more alike in body build and that this greater physical similarity leads them to seek out experiences that are more similar.

Additional evidence for the influence of heredity comes from the similarity between the intelligence of parents and children (about .50). Here again, of course, this similarity could come from the fact that parents and children live together. If this is the reason, however, we would expect an equal similarity between the intelligence of parents and the intelligence of children adopted at birth. This resemblance, however, seldom rises above .25 or so (Tyler, 1965). As adopted children grow older, moreover, they show more intellectual resemblance to their true mothers, with whom they have not been since birth, than to the foster mothers, with whom they have spent their lives (Tyler, 1965).

These several lines of evidence strongly support the hypothesis that genetic factors play some part in the intellectual development of the individual. If we are to use this hypothesis to account for intellectual differences in race or social class, however, we would have to assume that the groups obtaining the low scores were also less well endowed, on the average, with the genes that contribute to the intellect. An eminent physicist, Professor William B. Shockley, has made this claim and has urged large-scale investigations to test the hypothesis. His proposals have set off resistance (see Carter, 1970) and much controversy (*Newsweek*, 1971). Many people reject his hypothesis out of hand as irrelevant and needlessly offensive. Dr. Shockley holds that such laudable humanitarian feelings should not interfere with the sober need to examine the possibility.

Of the four hypotheses, or "suspects," we have considered, one (test favoritism) proves difficult to test. Two others (environmental stimulation and physical defect) have been shown to play some part in intellectual development. Since social groups clearly differ in these factors, moreover, we could also invoke these hypotheses to account for group differences in scores on intelligence tests. The fourth (genetic influence) has been shown to play a part in the intelligence of the individual. To invoke this hypothesis to account for group differences, however, would call for additional assumptions that are difficult to test and that prove intolerably offensive to many people.

Summary

Intelligence can be studied either through a philosophical analysis of its basic function or through a practical study of the results produced by various measurements of intelligence. Using the former approach Piaget has held that the intellect is a *system* of thought comparable to *systems* of digestion or circulation. This system develops a number of *cognitive structures* that enable the child to deal with the confusion of raw experience. Gradually the child develops inclusive sensorimotor schemata each of which deals with a vast number of specific experiences. When a new experience cannot be *assimilated* into this structure or schema, the latter becomes changed to *accommodate* it. The child thus maintains an equilibrium with the chaotic world by developing structures that enable him to deal with widely differing events as if they were *invariant*. After the acquisition of language, these structures take the form of broad classes (animals), relations, and abstractions, such as quantity and weight, which are conserved (remain invariant) in spite of other changes in the objects to which they apply. These are mastered in the stage of the concrete operations in which the rules of thought are developed. They function, provided they can be attached to concrete examples. About the beginning of adolescence, the rules are seen to function even without concrete examples (the stage of formal operations).

The practical study of intelligence test results has suggested that the underlying intelligence has a number of identifying attributes. It is linked to linguistic skill, to success in school, and to the ability to handle symbols, ideas, and relations. In some views, intelligence is a unitary thing, or has a pronounced unitary structure. In other views it may consist of a number of independent factors such as memory or reasoning, or even in a vast pool of unrelated abilities. The traditional tests have attempted to sample a number of different areas of ability and supply an average score based on these separate abilities. As he grows the child gets a higher and higher single score. Other tests provide separate scores for each of seven or eight factors, permitting several separate growth curves. One of the more ambitious theories of intelligence visualizes 120 separate factors arranged in a three-dimensional structure of the intellect. These factors come from the combinations of five *operations* (remembering, reasoning, etc.) applied to four contents (symbols, meanings, etc.), and resulting in any one of six *products* (units, systems, implications). This view has brought increased attention to creativity and problem solving.

In doing his reasoning, the child can use an impulsive *tempo* or a tempo that is more reflective. Each tempo brings some advantages and disadvantages, but, in general, the reflective tempo leads to greater success in the traditional tasks of the school. Typically, the child grows more reflective with age, but he maintains his relative position with respect to his peers. The more impulsive children of grade two will still be more impulsive than their peers in grade four.

Performance on the typical intelligence test is linked, *on the average*, to social class, race, and place of residence. Bright or dull individuals, of course, emerge from any background. Each child is to be treated as an individual. There has been much concern, however, about the reasons for the differences in group averages, and about the possibility of improvement. The differences could come from test favoritism, but so far this has not been demonstrated. There is evidence that disease and environmental deprivation play a part. To many people any mention of heredity is most annoying, but there is evidence to suggest that it, too, has some influence. To suspect a genetic factor at work within the child is not necessarily to suggest that this causes group differences. The latter suggestion would imply inferior genetic makeup on the part of the low-scoring groups.

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PART II

Promoting Learning in the Classroom

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Promoting Learning in the Classroom

Suzanne Szasz

4

Some Views of Learning

The topic of learning dominates much of educational psychology. To a great extent the development of the child springs from the learning that takes place. And the directing or managing of that learning is one of the most substantial of the teacher's many roles.

To get a picture of the many-sided nature of learning, we consider a few classroom illustrations and then see how different psychologists would try to explain such examples, or otherwise try to deal with them.

Some Illustrations

1. Some construction work is going on close to the school building. A truck with a loud distinctive sound rumbles up to the site and a few seconds later there is a terrific blast. Some schoolroom windows are broken and dust and fumes pour into the room.

The younger children cry and scream. For some days thereafter, at the sound of the approaching truck, many children look wild-eyed, fingers go to mouths, and there are other symptoms of distress.

2. When the kindergarten teacher first opens up the finger-paint cupboard and invites the children to play with the paints, Harry refuses to go near them, expressing disgust or concern. The teacher merely leaves him where he is, taking no notice of his refusal. Whenever, out of the corner of her eye, she sees him looking toward the paints, however, she smiles warmly and speaks to him cheerfully, not about the paints, but about something going on in the room. When he draws back from the paint she gets busy with something else. She smiles and talks cheerfully to him only when he leans toward the paint table, or reaches ever so little in that direction. She keeps this up, being busy with something else when he fails to move, smiling and paying cheerful attention as he comes closer and closer. After a few such sessions he begins playing with the paints, timidly at first, but later with more confidence and enjoyment.
3. Some children are preparing some posters and displays. A boy is nailing some boards together to make a frame. Most of the time the nail bends. The teacher gets him to use a lighter hammer, hold it toward the end of the handle, and swing it rather than push it.
4. Other children are painting, some making finished copies of previous sketches, others painting with no visible model. After a particular brush stroke, resulting in an unintentional knob, one child gasps and clasps her hand over her mouth. After looking at the result, however, she begins to smile. The teacher says, "That knob seems to interest you. Why don't you work it out?"
5. A young pupil receives four blocks, counts them and then receives three more blocks, again counting them. He is then asked, "How many altogether?" Again he counts and says, "Seven." The teacher then asks, "How many do you get when you put four and three together?" After a moment's hesitation the child answers, "Seven." The teacher agrees, "Seven. That's right." After several experiences, the child comes to give the answer much more quickly. Without the need of the blocks, he quickly responds to "4 + 3" by saying "7."
6. In recounting an experience a pupil says, "And the mud splashed on George and I." Teacher: "George and *me*." Pupil: "Me . . . Well, anyway, George and me had to go home and get cleaned up." Teacher: "This time it's George and *I*." Pupil looks puzzled. Teacher: "Try going over that again." Pupil starts but flounders. Teacher: "Pretend George wasn't there. Now tell what happened to you and what you did." Pupil: ". . . on me. I had to go home." Teacher: "Now put George back in." Pupil gives correct usage. Teacher: "Can you explain how it works?" Pupil: "Well, the *I* and *me* part is the same as if I was only talking about myself."

In these illustrations, some change—lasting or transient, for good or for bad—has taken place in a child. The teacher, moreover, has played some part, incidental or controlling, in producing this new behavior.

Understanding the Nature of Learning

We must not suggest that to direct experiences such as these the teacher needs a profound or complete knowledge of the learning processes that are involved. In the past, much excellent teaching has been done by people who were quite ignorant of the processes they were managing. In the same way, many excellent drivers know little, if anything, about what goes on under the hood of a car, or what machinery is at work when the starter key is turned or the steering wheel is moved this way or that. For the professional, however, whether driver or teacher, there should be some interest in the nature of the process being directed. It seems sad to visualize someone who is intimately immersed in an intriguing process and who is content to remain ignorant of the procedures by which he accomplishes his work. Some understanding of the learning process should boost your morale and give you a more sturdy image of yourself as a professional worker. If you have an ordinarily active intellect, moreover, you are almost bound to "theorize" at one level or another regarding the way pupils learn or why they fail to learn. Since you are probably going to be involved in theory anyway, you may as well consider the broad outlines of the classical views on the subject.

Meeting Public Expectation

Even if, by inclination, you could well forget about theoretical explanations of learning, circumstances may not let you. In the eyes of parents and the public, you may well be considered an authority on pupils and their learning. As far as the public is concerned, the influence of an articulate and observant teacher, such as John Holt, can often exceed that of the thoroughly trained psychologist. Just being a teacher, of course, does not automatically make you the local John Holt.

The Prevalence of Theory

Yet, of course, all men . . . are theorists. They differ not in whether they use theory, but in the degree to which they are aware of the theory they use. The choice before the man in the street and the research worker alike is not whether to theorize but whether to articulate his theory, to make it explicit, to get it out in the open where he can examine it. Implicit theories—of personality, of learning, and indeed of teaching—are used by all of us in our everyday affairs. Often such theories take the form of folk sayings, proverbs, slogans, the unquestioned wisdom of the race.

SOURCE: N. L. Gage, "Paradigms for Research in Teaching," in N. L. Gage, ed., *Handbook of Research on Teaching* (Chicago: Rand McNally, 1963), pp. 94–95.

But you may well find parents eyeing you expectantly when problems of learning or teaching are being discussed. And, here again, if you are going to deal with theories, and if your views on theory are going to be taken seriously, they should be reasonably well informed.

The teacher's professional responsibilities not only call for classroom work and for occasional dealings with the public. They also include, in a modest way, some obligation to maintain intelligent contact with current research. At a more advanced level, you may also find yourself, more and more, participating in such research, perhaps even teaching in an experimental program being tested by some investigator. In helping out with such an investigation, you would have a keener feeling of participation if you are generally acquainted with the more important psychological theories.

Aspects of the More Formal Theories

Everyone theorizes. The more ambitious, formal theories, however, go about this process in very businesslike fashion. In such a theory there is a tremendous urge to attain a neat, compact structure. Ideally, the theorist tries to work out a very few principles which would explain all the learning that has ever been observed. And in practice most theories do reach out to cover a great many diverse facts. Looking at things in this way, for instance, a theory would get points if it could explain the learning of both animals and men by the use of one single principle, and if this same principle could explain how people master the calculus, how they become neurotic, and how they are cured.

In this respect theorizing differs from the practical management of teaching. In your teaching, it is a mark of professional competence to be able to reach into your cupboard for one principle after another to take care of a practical problem. A theorist, however, would feel that he had missed the boat if you had to supplement his principle with some other additional rule or theory. He would probably go to some trouble to show you that his principle would have worked out, after all, if you had given it a fair try.

Variety in Theories

As everyone knows, and as we have implied, there are a number of theories of learning, each claiming to be self-sufficient, or almost self-sufficient, as an explanation of what children do, or fail to do, in school. However laughable this variety may seem, from the point of view of pure science, it may turn out to be useful in practice, and, anyway, there are reasons for it.

The Problem of Where To Start

In defining one word you have to use other words. Defining these words calls for the use of still others. At some point you will reach the stage where you have to make use of words you do not pretend to define. These are the basic, undefined terms that you and your listener decide that you can take for granted. Using these as building blocks, you can now work out more complex definitions of terms that you do not wish to take for granted.

More Detailed Information on the Nature of Science

Theories about theory (metatheory) seem a long way from the classroom. Much of the current educational ferment, however, has come from this concern. Sparked by the restiveness of humanists and activists we are worrying about what to think about education, how to think, and even whether or not to think.

For a general overview of the problems faced by theorists, see:

Alfred Baldwin, *Theories of Child Development*. New York: Wiley, 1967. Chapter One deals with "Common Sense and Its Role in Psychological Theory."

For more specialized treatments, see:

Frank S. Kessel, The philosophy of science as proclaimed and science as practised: "Identity or dualism?" *American Psychologist*, 1969, **24**, 999–1005.

T. S. Kuhn, *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1962.

Michael Polanyi, Logic and psychology. *American Psychologist*, 1968, **23**, 27.

Explanations, like definitions, must start somewhere. At some point or other the theorist will have to bring in principles or ideas that he does not explain. Like Euclid's axioms, or the postulates of some sciences, these are the things which no one proves, but which the theorist uses as his starting materials. In selecting his basic unexplained terms, the theorist could remain very close to the thing he is trying to explain, or he could go far afield. Mary asks, for instance, "Why did George hit me?" One theorist, staying close to the event, may suggest that George merely lost control of himself. Another theorist, moving further back, may link the attack to George's genes, to the astrological position of the stars, to the effects of alcohol, or to the kinds of behavior that had worked well for George in the past.

There may be much to be said for explaining George's action in terms of "loss of control." Its usefulness to you hinges on your ability to accept this "loss of control" as a "given"—as something that requires no explanation of its own. If such loss of control strikes you as self-evident and obvious, it may provide much immediate conviction and may neatly resolve the mystery. It is possible, however, that you may feel like asking, "But what made him lose control?" If this is the way you still feel, the explanation offered does not greatly help.

Few theorists stay so close to the facts to be explained. Most move further back and make use of broader principles capable of explaining not only this particular event but thousands of other events as well. Obviously in going back some distance for his givens or basic explanatory terms, the theorist, as we have seen, has more fields to choose from—genetics, early training, or the supernatural.

Attractive Familiar Givens

In this search for givens which, in themselves, require little explanation, psychologists have been attracted to two age-old and familiar processes. One of these is in the realm of physical mechanics. It says, in effect, "When an object is pushed (or similarly acted on by some force) it tends to move, or to be changed" (force-move process). The other primitive given is in the realm of purpose or intent. It says, "Someone's purpose, or intent, leads him to push, or press, or to initiate other types of movement or change" (intent-push process).

As Piaget has pointed out (Chapter 3), these two familiar processes dominate our lives from infancy on. Both have become exceedingly familiar and have lost their mystery. You are no longer bewildered when you see a stick begin to move when hit by the floodwaters. And any other phenomenon (soil erosion) that can be convincingly attributed to this process also becomes less puzzling. In the same way, you are not surprised when you see a hungry child going to some trouble to get a cookie. And here, again, you will experience some feeling of understanding when a less familiar phenomenon can be seen as the result of some intentional act. In asking "Why did George hit me?", for instance, Mary is probably asking about George's purpose or intent. What was he trying to accomplish?

Values and Limitations of Familiarity It is wonderful when a theorist can organize his explanations around principles that are familiar and easy to accept. We feel understandable gratitude when this is done. But it is not always possible. The overriding need is that the explanation really must come off, whether the principle used is self-evident or elusive, or even hard to accept. In his famous treatise, for instance, Newton had to use both kinds of givens. As one given he used the easy-to-accept notion that a force applied to an object will affect its rate of motion, causing a resting body to move, or a moving body to proceed at a different rate, perhaps slower, perhaps faster. But he also asked for other givens. He asked us to assume that a moving body left to itself and not acted on by any force would keep on moving at the same rate forever. This important given may not fit so neatly into our ordinary experience, since we are accustomed to seeing moving bodies gradually come to rest even when no very conspicuous force is observed. But it is only by granting this assumption, no matter how grudgingly, that we can enjoy the insights of Newtonian physics. Other givens demanded by various theorists are even more bizarre, and place an even greater strain on our credulity. The modern physicist, for instance, may ask us to assume the existence

Einstein's Feeling of Revulsion Against Preposterous Givens

On occasion the most sophisticated scientist may refuse to accept a "given" which goes against a compelling belief system. Einstein is the classical example. Contemporary physicists, starting with Einstein's own theories, explained the basic behavior of electrons in terms of pure chance. In a strictly statistical sense, one could predict that a certain number of electrons would move from one orbit to another. But this change seemed not to come from any definite cause. It was a matter of sheer probability. Einstein could not accept such an uncaused world. Some inner voice, he claimed, told him that it was wrong. He could not believe that God plays dice with the world. During the last thirty years of his life he tried to develop a precise theory capable of explaining the facts, and yet more in accord with his compelling scientific belief system.

SOURCE: Ronald W. Clark, *Einstein: The Life and Times* (New York: World Publishing Company, 1971). See the section beginning on page 339.

of a fourth, or fifth, or *n*th dimension. A psychologist may ask us to accept the assumption that each of us is in tune with some vast collective unconsciousness belonging to the whole human race. One interesting theory, attempting to account for racial conflict, assumes, as a given, that mankind is basically black and that, originally, all men were black. Because of some misdeed, or lack of faith, however, God or Allah decided to punish the human race (black) by deliberately creating a special "devil group" (white) for the specific purpose of tormenting or plaguing the people who really mattered. A given such as this might well lead to a very neat explanation of some historical facts. If the very given that is required, however, seems too fanciful to accept, the entire explanation might lose its conviction or intuitive appeal.

More Elaborate Givens

It would be wrong to suggest that a psychological theorist has merely to choose between the cold, impersonal *force-move* givens, on the one hand, and the more subjective *intent-push* givens, on the other. Some theorists invoke both kinds of givens. Psychoanalytic or Freudian psychology, for instance, holds that the energy of the mind comes from purpose or intent, but also assumes that this energy is governed largely by the force-move principles of physical mechanics. Gestalt psychologists, on the other hand, disregard both types of primitive givens and look to the area of *field theory* for their principle assumptions. According to their view, there are broad field forces which govern the behavior of the individual particles within that field. There is a field of force at work in the whirlpool, for instance, which controls the behavior of each particle of water. Similarly, the field forces within the solar system control the behavior of any object entering that field. Gestalt psychologists ask us to assume that there are comparable field forces that govern our experience. What we see depends not only on some tiny point of light, but, more likely, on the broad pattern of which it is a part.

Imaginary Givens

In some explanations the givens invoked are quite real. In explaining the damage done to our garden, for instance, we could speak of insects that anyone could see and few people would dispute. In many theories, there are other givens which no one has observed up to that point, but which are, nevertheless, thought to be real. It is assumed that when people get around to it, or when the proper techniques are devised, this given will be found. Such givens are often labeled *hypothetical constructs*. In their experiments on the disease of beriberi, nutritionists decided that there must be *something* in the hull of the rice kernel which prevented the ailment. They called this unknown something Vitamin B_1. At this time, no one had seen the actual substance. People suspected, however, that some day it might be found. During the time that this vitamin was called for, but not identified, it would be regarded as a hypothetical construct. Later on, of course, the vitamin was observed and identified as a definite chemical. At this point it ceased to be a hypothetical construct and became an actuality. For many years the genes were also hypothetical constructs. Geneticists assumed that some such entities must be there, but no one had ever seen one. With the development of the electron microscope the objects themselves were identified and the imagined entities (hypothetical constructs) turned out to be real.

There are other givens which no one ever expects to observe directly. The force of gravity, for instance, has never been seen and must always be inferred from its effects. Some psychologists will explain the rat's behavior in terms of his *purposes* or *intentions*. Such purposes in the mind of the rat can never be observed directly. Givens such as these are often labeled *intervening variables*. They are unseeable things which, if assumed to exist, would make sense out of the things we do see.

Some intervening variables, although never observed, may, nonetheless, be regarded as real things. You may well believe that there really is a force of gravity, or that the marauding rat really has some nefarious purpose in mind. For other intervening variables, the question of reality hardly seems to be an issue. You do not spend much time, for instance, in wondering whether or not there really is a fifth dimension. Still other givens or intervening variables may even be regarded as obviously unreal, or as useful fictions. We speak of water "seeking" its own level. This idea of "seeking" is a useful given. The water moves *as if* it had such an urge or purpose. Hardly anyone, however, would suggest that such an urge really existed.

More Detailed Information about Theories: General

This chapter deals with the broad general theoretical approaches, their relation to each other, and their usefulness in the understanding of classroom learning. In these few pages we can merely glance at issues that call for several volumes of closely packed writing. To get some idea of what each theory says, you should consult more specialized treatments. Typically, you will find it most useful to begin with one of the standard textbooks on psychological theory. In these you read about any one theory in relation to the others. Beyond this, you may wish to go to more comprehensive treatments, and beyond these again, to some of the original contributions made by the theorists themselves. The following textbooks on theory are extremely useful, and will be mentioned in other boxes in this chapter:

R. S. Woodworth and Mary R. Sheehan, *Contemporary Schools of Psychology*. New York: Ronald, 1964.
Balanced view of general psychological theories. Written in a simple and natural style.

Ernest R. Hilgard and Gordon H. Bower, *Theories of Learning*. New York: Appleton-Century-Crofts, 1966.
Concentrates on theories of learning. Probably the standard reference in this area. Some of the discussions verge on the technical.

Ernest R. Hilgard, ed., Theories of learning and instruction, Part I, *63rd Yearbook of the National Society for the Study of Education, 1964*.
A collection of articles on various theories of learning. These vary in ease of understanding.

Winfred F. Hill, *Learning: A Survey of Psychological Interpretations*. San Francisco: Chandler, 1963.
The briefest general survey. Intermediate level of difficulty.

For more substantial treatments about any one theory, look up that theory in

S. Koch, ed., *Psychology: A Study of a Science*. New York: McGraw-Hill. Various dates beginning in 1959.
This is a series of volumes. Some of the monographs are written for the series by the theorists themselves. Others are written by authorities in the field.

Theories Stressing Cognitive Givens and Human Attributes

When he sets out to explain learning or similar phenomena, a theorist can reach out for many different kinds of givens. Staying fairly close to the human activities to be explained, he can select, as his basic assumptions, things that he sees in the human mind, or that are part of human experience. Going much further back, on the other hand, he can base his theory on the givens of physics, or chemistry, or biology. A number of theorists have chosen the first approach and have tried to explain classroom activities in terms of the kinds of ideas or cognitions we see in our own minds, or in terms of the human concerns seen in ourselves and recorded in philosophy, literature, and art. Some theorists—some of the *humanists*, for instance—take this stand, partly out of repugnance toward the idea of reducing human beings to animals or machines and thus minimizing the essential human experience. Other theorists—some of the *cognitive* psychologists—feel no such repugnance but take this stand because they hold it is the only approach that really will explain the facts to be observed.

More Detailed Information: Humanistic Psychology

The roots of humanism lie in the European work of Kierkegaard in the mid 1800s, and of Jaspers, as interpreted by Sartre and Camus. Its American impact lies in the interpretations of Maslow, Rollo May, and Carl Rogers.

For references to the earlier classical work, see:
Rollo May, ed., *Existential Psychology*. New York: Random House, 1966.

For discussions of the current impact, see:
Charlotte Buhler, Basic theoretical concepts of humanistic psychology. *American Psychologist*, 1971, **24**(4), 378–386.
Frank Goble, *The Third Force: The Psychology of Abraham Maslow*. New York: Grossman, 1970.
Ernest Keen, *Three Faces of Being: Toward an Existential Clinical Psychology*. New York: Appleton-Century-Crofts, 1970.
Rollo May, *Love and Will*. New York: Norton, 1969.
Leroy F. Troutner, The confrontation between experimentalism and existentialism: From Dewey through Heidegger and beyond. *Harvard Educational Review*, 1969, **39**(1), 124–154.
Anthony J. Sutich and Miles A. Vich, eds., *Readings in Humanistic Psychology*. New York: Free Press, 1969.

Humanistic Psychology or the Third Force

Humanistic psychology is often regarded as a protest against the alleged extremes of both behaviorism and psychoanalysis (see below), hence the term "Third Force." Like its existential allies, this movement casts a suspicious eye on some of the alleged pretensions of traditional science. It holds that science itself can prosper only when it recognizes itself as a human enterprise. According to the humanists, science should not be regarded as a composite godlike antenna bringing in the impersonal objective truth. Science is the activity of human beings, dominated by human needs, studying some things and ignoring others as determined by very human concerns.

Student Views of the Humanistic Approach

Students in an introductory course in psychology were required to read both a conventional "experimental" text (Munn) and a book of readings on humanistic psychology. In class, the instructor took a neutral stand with respect to the humanist-experimental controversy, but also announced his private leanings toward cognitive theory and the experimentalist approach. When the students (63 freshman women) had completed all the humanistic readings and most of the experimental text, they wrote their reactions to the two approaches. Comments ranged from three to ten typewritten pages.

Results (Questions paraphrased)

Is there a place for the humanistic approach in psychology?
  Yes, 63% (Optimistic viewpoint; maintains human element; meets typical student interests).
  Yes, but: 21% (Relevant to some phases of psychology: A framework rather than a program).
  No, 6% (Nothing but theory. Why object to using physics as a model?)
Is there too much neglect of humanism in general psychology?
  (Only 23 students answered. Most—74%—said "Yes.")
Is your instructor a humanist?
  No, 66%; To some extent, 33%.
Do you regard yourself as a humanist?
  Yes, 56%; Partly, 20%; No, 24%.
Are the humanistic criticisms fair and well taken?
  (Only 38 students answered).
  Yes, 37% (Points out—and fills—an important gap.)
  Not so sure, 47% (Unwise to rely on intuition. Humanism mostly negative criticism. Useful, but would leave us short of complete understanding).
  No. 16% (Humanistic approach incompatible with science).

Of those who regarded themselves as humanists, 52% thought the humanistic criticism unfair.

SOURCE: Martin S. Lindauer, Student views of humanistic vs. conventional conceptions of psychology in the first psychology course, *Journal of Humanistic Psychology*, 1967 (Fall), 128–138. Reprinted in Anthony J. Sutich and Miles A. Vich, *Readings in Humanistic Psychology* (New York: Free Press, 1969).

Many humanists also take violent issue with the traditional scientist's insistence on objective, impersonal facts, and with his disdain or disregard for human conviction, and for the serious intuitions that dominate our lives. Members of the third force see this traditional scientist as reducing each of us to some faceless average. In this respect they think the scientist is a less dependable guide than the poet or dramatist. For these artists, individuality and the unique are the meat of life. Humanistic psychologists also deplore those psychological treatments that refuse to consider people as basically different from dogs, rats, or earthworms.

In commenting on our classroom activities, the humanist would be rather general. He would emphasize the larger meaning of each experience. Rather than deal with the detailed mechanics by which the changes are effected, he would ask how the tasks and the experiences fit into the total pattern of the child's life and how they affect him. To make humanistic sense, any learning attempted should have some significance for the whole person—for his mind and his feelings. Preferably this learning should grow out of some genuine problems that the student has clearly experienced. This problem should strike him as meaningful and real, rather than artificial or contrived. In solving it he should find room for initiative and a feeling of responsibility, and he should thereby gain in these attributes. Certainly these experiences should not stifle his spontaneity or creative urges, nor should they endanger his sense of worth or his feeling of acceptance by those who count in his life.

In accepting the child's answers, in sharing his relish of the off-beat painting, and in showing possibilities of improvement, the teacher modifies the child's image of himself as a significant and still-growing person and as a person intimately involved with others. These enhanced or modified perceptions of the self come into play, in turn, to affect his interpretation of experiences still to come.

Cognitive Psychology

Humanistic psychology contains much more than gush and goodwill. At times it is hardheaded and analytic in the extreme. To some extent, however, and in the hands of some of its proponents, it does have an evangelical component.

This veneration for the human, qua human, is less typical of the cognitive psychologist. He squirms not at all when he finds his principles embrace rats as well as philosophers. To him it is a tribute to his theory that, within it, poet and rodent are cousins under the skin. Cognitive psychologists rely on human mental givens, not because they are more worthy or more flattering to our humanity, but because, in the cognitive view, such givens are the only ones that will work in explaining the behavior of either mice or men.

The classical cognitive psychologist asks you to accept, as givens, the fact that people (and presumably other organisms) have intentions or purposes, ideas or cognitions, expectations or realizations, and that they make decisions that may result in action. Cognitive psychologists make much of the varied and unpredictable behavior by which an organism predictably attains his goal. When the wind, for instance, starts blowing the papers around, a man gets up and closes the door. Knowing his distress, and inferring his intent, we can readily predict his act. But what precise movements did he make to accomplish this act? These we would be foolish to predict. There are many physical movements by which one may close a door—using hand, foot, elbow, hip, or knee. And the method used will depend on the overall situation (see gestalt psychology below). But through one movement or another we can expect the door to be closed.

More Detailed Information: Cognitive Psychology

Cognitive psychology has had a sturdy role in American psychology for almost half a century. It is regularly treated in such standard texts (see box on p. 111) as Hilgard and Bower, or Hill.

A more recent and more technical description can be found in:
Frank Irwin, *Intentional Behavior and Motivation*. Philadelphia: Lippincott, 1971.

The classical statement of the position was developed by:
Edward C. Tolman (1886–1959) in his book *Purposive Behavior in Animals and Men*. New York: Appleton-Century-Crofts, 1932. Reprinted, Berkeley: University of California Press, 1949.

Our man will do something which in his mind might be *expected* to close the door. These *expectations* constitute a key feature in cognitive explanations of learning. As a result of experience the child learns that "doing this leads to that." Through his experience, for instance, one child learns that "When you come across 4 + 3, then saying '7' will make the teacher happy." A second child learns that "Grasping the handle near the end and swinging the hammer will help keep you from bending the nail." A third develops the realization or insight that "The rules about 'I' and 'me' are the same whether you are talking about you and somebody else or only about yourself." These expectations, or realizations, or insights are carried around by each child, and are used to fit in with any purpose that may be acting on him. If he wants to make the teacher happy, he can say "7." If he wants to annoy the teacher he can say something else. When he has a need or a purpose to drive a nail straight, he can grasp the hammer at the end of the handle. If this goal is not important, he can employ the more natural childish procedure and grasp the hammer near the head and push it at the nail.

In two of our illustrations, by the way, the role of conscious expectations and decisions has been challenged. The behaviorists (see below) may deny that the children trembling at the sound of the truck would consciously realize that this fear has been associated with the explosion. Similarly, the behaviorist might claim that the child who has become less fearful of the finger paints might have no conscious idea that "It is when you get close to the paints that the teacher smiles."

In using cognitive theory to encourage learning, the teacher can do much to emphasize the crucial aspects of the relation between behavior and outcome. The teacher can point out to the child, "It was your triumphant gloating (behavior A) and not the loss of the game that caused George (outcome) to sulk." "The thing that made me so happy (outcome) was that you not only did well in the play (behavior A) but that you helped Susan (behavior B) when she forgot her lines." "By grasping the handle near the end (behavior) you not only drive the nail straighter (outcome A) but also keep from bruising your knuckles when working in close quarters (outcome B)."

These expectations or realizations become obvious or manifest when we see a child using them to satisfy some need or purpose. The expectation, however, could come into being quite apart from the need or purpose. Even when you have no interest in getting to the airport (outcome), you might notice a new route and decide that taking this route (behavior) would save time. The behavior does not actually occur, or become manifest, however, until you have some need or intention of reaching the airport.

More Detailed Information: Stimulus-Response Psychology

This approach, suggested by Edward L. Thorndike (1874–1949) and developed by Clark L. Hull (1884–1952), has consistently placed tremendous emphasis on learning. There are several chapters in Hilgard and Bower and in Hill on the different positions within this approach. Further summaries are to be found in Winfred F. Hill, "Contemporary developments within stimulus-response learning theory," *Yearbook of the National Society for the Study of Education*, 1964, **63**, Part I, 36–68.

The controversial general position of behaviorism has been the subject of many books. See:

D. E. Broadbent, *Behaviorism: A Survey of 20th Century Theory in Behavioristic Psychology*. New York: Basic Books, 1961.

In 1972 the extreme position of B. F. Skinner was publicized in his book *Beyond Freedom and Dignity*. At that time the book provoked much controversy, and it may still be influential as you read.

Theories Stressing Mechanistic Givens

In contrast to humanistic and cognitive explanations, some theories prefer to start with the mechanistic givens of physics and other natural sciences. If this approach should work, it would result in a great saving of principles (parsimony) and should include a vast number of phenomena which, with respect to this principle, could be treated as similar or invariant. A few compact laws would account for the behavior of protons and pollywogs, molecules and men, volcanic eruptions and campus riots, the entropy of physical systems, and the rise and fall of empires. Intrigued by the possibility of such a compact structure, many psychologists have worked hard to show that human and animal activities can be interpreted by using the givens of physics, biochemistry, and neurology. Many people, of course, feel marked revulsion toward this attempt to translate our vivid human experiences into the cold categories of physics and biology. Others, quite sympathetic to the goals, have doubted the actual or possible success of the enterprise. Nevertheless, these theorists have given a tremendous amount of attention to learning and have come up with some interesting notions to help understand some of the facts in that area.

Stimulus-Response Psychology

Since the turn of the century, many psychologists have been intrigued by the parallel between the reflex arc in neurology, on the one hand, and much of behavior, on the other. The neurologist can draw diagrams to show how the candle flame touching the finger (stimulus) leads to the rapid jerking back of the hand (response). To explain this, he need not mention feelings, or ideas, or purposes. He merely envisages a mechanical neural process. Even in its complexities this process seems to be a vigorous biochemical action. Psychologists have wondered if this mechanistic formula could not also be applied to situations in which the child hears the rumble of the truck (stimulus) and helplessly begins to tremble (response), or when he hears the words "4 + 3" and, in almost automatic fashion, thinks "7."

Within the S-R camp there are several different subapproaches. Some S-R psychologists talk quite freely about mental stimulus or mental situations. They think, for instance, that one idea (black) acts as a stimulus to evoke another idea (white) as a response. Others, the behaviorists, try to reduce all stimuli and all responses to physical terms. A third group, represented by B. F. Skinner, talks chiefly about responses, and has less to say about the stimuli that may have been at work to initiate the responses.

Learning by Mechanical Association In describing the kinds of learning in our illustrations, most S-R psychologists would use two principles: the principle of *association* and the principle of *reinforcement*. In its extreme form, the principle of association visualizes a child making a response (trembling, crying, or becoming hysterical) while at the same time some stimulus (the fading rumble of the truck) is acting on him. According to this principle the stimulus then becomes automatically attached to the response, so that whenever the rumble of the truck is heard again, the responses of trembling or crying will be called forth. This can be quite automatic and does not demand that the child be aware of what is going on. Here we have the well-known conditioned reflex stressed by Pavlov and others.

To some psychologists, the mechanistic mindless process of the conditioned response could be used to explain all learning. Such psychologists, for instance, would point out that while the child was thinking of "4 + 3" (stimulus or situation) he was also led to say "7" (response). Through conditioning, 4 + 3 would then become attached to the response so that 4 + 3 would automatically lead to saying "7." While the student faced the hammering situation, he was led, by the teacher's suggestion, to respond by grasping the handle in a certain way. Situation and response thus become connected. While another student faces the puzzling question of "I" or "me" (S), he is led by the teacher's questions to think of a rule (R). In the future, when he faces the problem, he will again think of the rule.

Learning Through Reinforcement Few S-R psychologists of the present day rely exclusively on the principle of association or conditioned response learning. Most of these psychologists also make use of reinforcement, and to some (B. F. Skinner, for instance), reinforcement is the crucial overriding principle. Reinforcement, although easy to illustrate, is difficult to define. Reinforcement occurs when the child, after saying "7" (response), hears the teacher say "Good." It occurs when the child, having moved tentatively toward the paint cupboard (response), notices the teacher paying attention to him. It occurs when the budding carpenter swings the hammer in a certain way (response) and sees the nail going in straight. In less physical fashion it may also be invoked when the puzzled student thinks (response) about a certain rule and then finds his bewilderment reduced.

What do these instances of reinforcement have in common? It is hard to answer precisely. "Good" things, perhaps. Combinations of events which have been biologically valuable in the history of the race. Whatever their basic nature, they are fairly easy to identify when we meet them. You can readily decide on the things which, coming after a response, can be depended upon to make that response more likely to occur. Considered in this way, reinforcement would be an unexplained given used as a starting point.

Reinforcement, by the way, may be an unfortunate label for the process it is supposed to describe. When you think of applying reinforcement, your mind may turn to things like supplying general encouragement, or providing support for the child. But the term as used technically does not refer to such general encouragement. When used in psychological theory, reinforcement refers to something which occurs *after* a response is made and which is expected to make that response more likely to occur in the future.

A further caution: Almost all psychologists would approve of what the teacher has been doing in our illustrations of reinforcement. In the views of other theorists, however, the actions of the teacher do not work through simple reinforcement but function in other ways. The cognitive psychologist, for instance, thinks that the teacher's statement of "Good," or her smile of approval merely helps establish one of the all-important expectations. In several mathematical theories (see below), the teacher's comment, or any other "reinforcement" merely serves to terminate one episode and insulate it from experiences that are about to occur. Lacking such insulation, a stimulus such as "4 + 3" might linger on in the child's experience and, being thus present even in somewhat ghostly fashion, might become associated with some later irrelevant or conflicting response. By saying "Good," or by supplying some other vivid experience, the teacher isolates the ideas of 4 + 3 and 7, wraps them up in a tidy package, puts this package to bed, and partially protects it from the interference of later experience.

Reinforcement, so vital in practice and so prominent in some theories, will be mentioned again and again in this book. In Chapter 6, in particular, reinforcement is the main topic.

Theories Stressing More Esoteric Givens

Not all psychological theorists rely primarily on the purposive givens of immediate experience, or on the mechanical force-move givens of physics. Some invoke combinations of these things. Others seek their basic explanatory terms in the field theories of physics which became prominent in the last century.

Psychoanalytic Theories

Psychoanalytic theories, proposed by Freud and by ego psychologists such as Erikson, make much use of purpose, or drive, or urge. They see these entities, however, not as free-floating agents, but as forces that obey the laws of physical mechanics or energy systems. These theories are greatly concerned with the manner in which impulses, intentions, or other forms of psychic energy are regulated by such postulated structures as the id, the ego, and the superego.

Of the three Freudian structures the id is the most primitive, and it never ceases to be the source of the impulse, striving and desire, that make up the available psychic energy. At birth the child is all id. His psychic energy is governed by the pleasure principle and is directed to the immediate gratification of impulse. Without direction, however, the id might become focused on some outlets that might turn out to be futile or wasteful if not actually lethal.

The infant's very survival is made possible only through the development of a realistic, logical ego, which examines the outlets that the id is poised to use, forbidding those that are dangerous or illusory and permitting those that are safe and real. To do these things, the ego uses intelligence, judgment, and logic. These belong to the ego and to the ego alone.

More Detailed Information: Psychoanalytic and Gestalt Views

Psychoanalysis, of course, is part of general folklore and is treated in dozens of good paperbacks to be found in any bookstore. Of these we may mention:

Maryse Choisy, *Sigmund Freud: A New Appraisal.* New York: Citadel, 1963.

Reuben Fine, *Freud: A Critical Re-evaluation of His Theories.* New York: McKay, 1962.

Hilgard and Bower devote a chapter to the psychoanalytic treatment of learning.

For other textbook treatments of Freudianism, see the ego psychology of Erik H. Erikson as developed in his book *Childhood and Society,* 2nd ed. New York: Norton, 1963.

For gestalt psychology, there is a tremendous literature. It is treated by Hilgard and Bower, and by Hill. Hilgard provides further evaluation in his article "The place of gestalt psychology and field theory in contemporary learning theory," *Yearbook of the National Society for the Study of Education,* 1964, Part I, 54–77.

The classical gestalt work on insight in learning is found in Wolfgang Koehler's book *The Mentality of Apes.* New York: Humanities Press, 1926.

So far adaptation-level theory has had little treatment in the standard texts. There is a brief treatment by William Bevan in "The contextual basis of behavior," *American Psychologist,* 1968, **23**, 701–714.

The primary source by the originator, Harry Helson, is in his book *Adaptation-Level Theory.* New York: Harper & Row, 1964.

The great role of the ego is logical, realistic, prudent control. In truly fearsome situations, however, as when the infant anticipates the wrath of a jealous father, this prudent, analytical agent may seem an insufficient protection. Additional protection comes from a system of automatic and irrational powerful inhibitions adopted from the moral code held by the child's parents. These unthinking "Thou shalt not's," coupled with some positive injunctions, constitute the structure of the superego, and assure a measure of automatic unthinking compliance.

As everyone knows, the interaction of these structures in addition to fostering conventional morality can give rise to a host of other phenomena. The primitive earthy impulses of the id, denied conscious expression by the superego, may work toward an indirect expression which the superego cannot detect. The aimless paintbrush of the budding artist may sketch a hint of some object which momentarily shocks her, but later mischievously intrigues her. Much creative expression has been held to consist of acceptable, quasi-hidden treatment of forbidden matters. The teacher fostering creative work might feel the need to encourage the child to give more complete expression—transformed or distorted though this expression may be—to these unconventional feelings now giving timid hints of themselves.

The conflict between unconventional urges of the id and the fussy, arbitrary prohibitions of the superego can also give rise to neuroses and other unfortunate conditions. In Part III of this book we consider what the teacher might do to mitigate this danger.

Ego Theory The Freudian theory developed half a century ago has received surprisingly little modification by disciples. To a remarkable extent the words of the master still stand. As one exception to this hands-off attitude, we should consider the theories of *ego psychologists* such as Erik Erikson. These psychologists cannot easily see how a rational ego could develop from an id which is all impulse, and which, in its original state, contains no hint of rationality or logic. To them, the ego seems not to be en extension or a modification of some phase of the id, but, like the id, it was there from the beginning. During early life, of course, the id and the ego become sharply distinguished from each other, but one does not grow out of the other.

This ego, with its independent origin, interacts with the id and mediates between the id and the external world much in the manner that Freud described. But this independent ego also has concerns of its own. White (1960) has made much of the urge for competence or effectance, the urges to get things done and to see ourselves as effective doers. According to Erikson it is the ego and its requirements that launches us on the agonizing struggle for identity, in which we are driven to pull together the various views and pictures of the self and to see ourselves as an integrated, worthy individual. These suggestions, along with Erikson's famous treatment of the eight stages of man, are developed in more detail in the discussion of character and socialization (Chapters 12 and 13), and these issues, obviously, have tremendous significance for the teacher and the schools.

Gestalt Psychology

As we have pointed out in the discussion of "givens," the *gestalt psychologists* ask us to assume that our experience is governed by *field forces* that maintain a total pattern. The German word *gestalt* actually means pattern, or configuration, or structure. The gestalt psychologists point out that in the world of physics, it is often the larger process or pattern which comes first and which determines the actions of the elements making it up. The field of force surrounding the magnet, for instance, will control the behavior of any individual iron filing that enters the pattern. The gestaltists ask us to assume that such patterns, or structures, or fields also dominate human experience. If we do accept the existence of such forces, we can readily see how they would explain many facts. They would account for the fact that upon seeing the general outline of a word, we see all the letters even if one of them has been left out or is incomplete. If the pattern of a melody demands a certain final note, we "hear" that note even though someone may have turned off the music before that note was ever played. Such facts would lose their mystery if we wholeheartedly accept these pattern-producing forces and see the manner in which they work. In practical teaching, moreover, the use of patterns can often dominate. The troublesome problems of "George and I" versus "George and me" vanish when the matter is clearly seen as part of a general pattern.

The original doctrine of gestalt psychology does not now stand out as clearly as it did in the second quarter of the century (Helson, 1969; Hilgard, 1964). Perhaps it has been too successful and has thus been quietly absorbed into other positions. It is in this role of a quiet background theme that gestalt psychology appears in this book. Later chapters (especially Chapter 7) fairly bristle with emphasis on structure and the organization of experience. Gestalt notions are also stressed in the treatment of group processes and social climate.

Adaptation-Level Theory Like gestalt psychology, adaptation-level theory lays great stress on the familiar fact that all experience is relative. Our reaction to any stimulus depends not only on the physical nature of the stimulus but also on the context in which it occurs. The candle flame that we can hardly see in broad daylight can become the outstanding focus of illumination during the nighttime power failure. Our reaction to an event also depends on what we have been used to in the past. The warm, balmy day of the arctic spring would be a numbing, chilling catastrophe coming on the heels of a tropical summer. The unbelievable luxuries of our childhood strike us later on as the paltry trappings of the very poor. Rewards, especially, are relative. An event that would be tremendously rewarding or acceptable in one context would be trivial or even punitive in other circumstances.

To account for such familiar phenomena, and for many observations of a more technical nature, the adaptation-level theorists put forth a number of givens. First, they ask us to assume that each of us carries around a host of reference points, or adaptation levels. The impact of any new event depends, not primarily on its intrinsic properties, but on the extent to which it differs from the "relevant" adaptation level. We carry one reference point or adaptation level, for instance, for the heights of men and another for the heights of women. The height of a given man will have little impact on us unless it differs considerably from the adaptation level that we carry around for the height of men. As a second given, they suggest that these adaptation levels are made up by the averaging of all stimuli *of that kind* so far encountered. Our reference point for the heights of men, for instance, is the average of the heights of all men that we have seen so far. Some allowance is made so as to give more weight to the more recent experiences. Those having a maximum of recency—those present right now—will have the greatest effect in establishing our reference points.

Adaptation levels have much significance for teachers. The adaptation-level theorist, for instance, would suggest that Harry's gradual acceptance of the finger-paint materials came partly from the change in adaptation level. With continual exposure to the litter of the materials, the adaptation level changes, and in relation to this altered adaptation level, the finger-paint materials seem less filthy. At times these levels also complicate our work. The teacher, adapted to some of the more intricate concepts of mathematics, may see little difficulty in dividing by a fraction. To the pupil, with his much more modest adaptation level, this may represent a giant step in difficulty.

More Detailed Information: The Computer Approach and Mathematical Theories

The newer approaches are described in Hilgard and Bower and in several chapters in the collection edited by Hilgard (1964). They are also developed in detail by Helen I. Snyder in *Contemporary Educational Psychology: Some Models Applied to the School Setting*. New York: Wiley, 1968. In view of the subject, it is not surprising that even the textbook treatments are often quite technical.

There is a brief lively discussion of some issues of mathematical theory in a book review by William H. Batchelder and John I. Yellott, Jr., *"What's (nu) in Math Psych?" Contemporary Psychology*, 1971, **16**(10), 625–630.

The general approach is also set forth in an earlier book review by William K. Estes, one of the chief contributors to the field. This appears in his review of Greeno's Elementary Theoretical Psychology, *Contemporary Psychology*, 1969, **14**, 590–593.

There are scores of books on the significance of the computer for psychological theory. One of the most readable accounts is the pioneering monograph by George A. Miller, Eugene Galanter, and Karl H. Pribram, *Plans and the Structure of Behavior*. New York: Holt, Rinehart and Winston, 1960.

Snyder and Hilgard and Bower also discuss the implications of the computer approach.

Computers, Task Analysis, and the Mathematician

Computers are not to be ignored. Although they may never completely replace the teacher, they may play an increasing part in the educational picture. At the moment, however, we are chiefly interested in the way the computer has affected psychological views of learning and behavior. For one thing, the computer has focused our attention on task analysis. If you want a computer to perform a typical human task, you must analyze the task in very precise fashion. As you describe each separate step, moreover, you are painfully aware of the fact that someone—your friendly computer engineer—must be able to find, or develop, the machinery necessary to perform each of these essential steps. This experience gives you a very vivid picture of the task and the things required for its performance. When you later try to explain the behavior of the human being, you are almost bound to keep this vivid picture in mind. Since the human being also performs the task, he also must have *some* machinery for carrying out each essential step in the task.

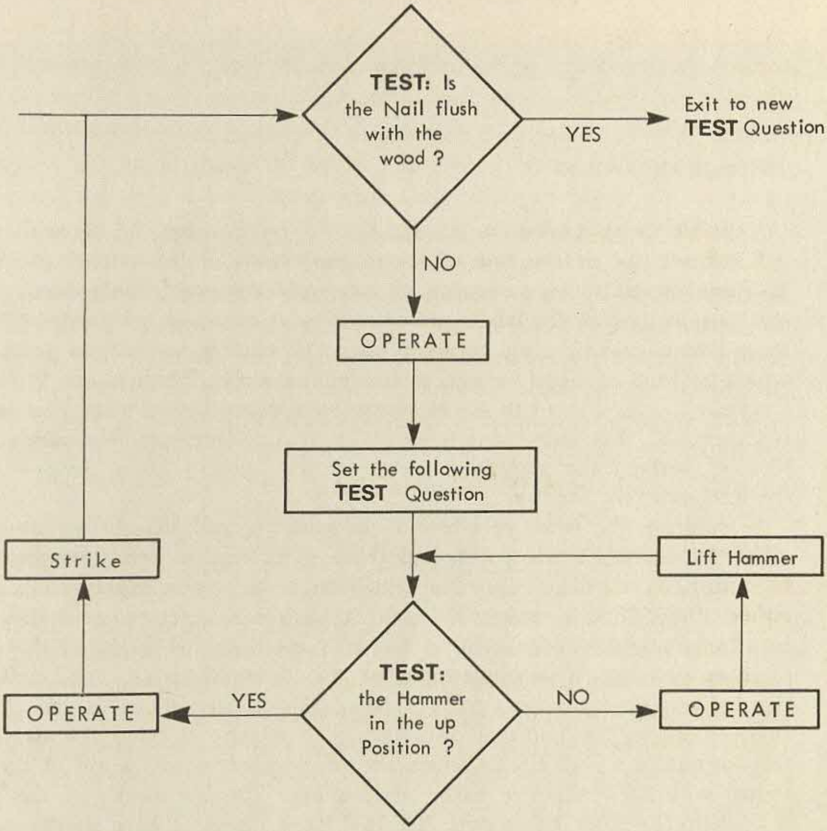
Consider the simple task of hammering nails. At first the boy's behavior must be determined by the condition of one particular nail. If that nail projects above the surface of the wood it must receive another blow, and if it still projects, still another blow. In computer language, the boy is in a *loop* controlled by the "flushness" of the nail. As soon as this nail has been driven flush, however, the control must be transferred to another nail and the new "loop" run out. While within any loop, the boy must *Test* (Nail flush? Yes or No). If "No" he must *Operate* (strike the nail). He must then *Test* again. When the answer to his test is "Yes," he must *Exit* from that loop and go on to another loop.

One group of psychologists (Miller, Galanter, and Pribram, 1960) has claimed that all behavior should be analyzed into such sequences of Test—Operate—Test—Exit, or *TOTE* sequences. In everything we do, they maintain, we remain in one loop, under the control of one test question, until the test gives a selected answer. We then leave that loop and enter a different loop under the control of a different test question. Many educational activities are now described as flow charts or programs using such units (see Yee, Shores, and Skuldt, 1970).

The Emphasis upon Task Analysis

The computer approach has led to meticulous analysis of tasks. The simple matter of striking a blow with the hammer turns out, upon analysis, to be itself complex. To do this there must be a subloop which demands a test for the position of the hammer and one operation (strike) if it is up, but for another operation (lift) if it is down. A more general level to this approach has also focused our attention on lower-order skills that must be available if a more complex task can be carried out. Before he can strike, he must be able to lift the hammer. Before he can lift, he must be able to grasp. Many educational processes are now being explored to detect the hierarchies of skills that may be involved (see Chapters 8 and 10 for the work of Gagné and others).

Theories derived from work with computers have also been applied to problem solving (Chapter 8) and to the problems of memory retention (Chapter 9). To get a computer to duplicate some feats of human problem solving, for instance, it has been necessary to endow it with two kinds of memory. There is need for a transitory short-term or immediate memory, by which the telephone number we hear is momentarily stored in verbatim fashion. There is also need for a long-term memory in which treated events are more or less systematically stored away for later retrieval.


TEST: Is the Nail flush with the wood ?
YES
Exit to new TEST Question
NO
OPERATE
Set the following TEST Question
Strike
Lift Hammer
TEST: the Hammer in the up Position ?
YES
OPERATE
NO
OPERATE

A *TOTE* analysis of driving a nail. Adapted from George A. Miller Eugene Galanter, and Karl H. Pribram, *Plans and the Structure of Behavior* (New York: Holt, Rinehart and Winston, Inc., 1960).

Mathematical Approaches

Most theories of learning, of course, make some use of mathematics. The theories considered in this section, however, go beyond such incidental use. In these theories the chief emphasis is on a rigorous, consistent analysis of the process of learning. In working out a treatment that is thus logic-tight and consistent, the theorists must take a searching look at the givens or basic assumptions. They must be sure that the givens chosen will lend themselves to rigorous mathematical treatment. In looking for givens that meet their need, however, they also come up with ideas or questions that mean something in a psychological sense.

The mathematician must decide whether he is dealing with a process that is continuous (gradual increase in heat), or one that moves by discrete quantum steps (switch open or closed). And the mathematical theorists have asked whether they should treat learning as a broad process, like typing, or as a whole

A Contrast

Humanistic Protest

Valuable as have been the contributions of behaviorism, I believe that time will indicate the unfortunate effects of the bounds it has tended to impose. To limit oneself to consideration of externally observable behaviors, to rule out consideration of the whole universe of inner meanings, of purposes, of the inner flow of experiencing, seems to me to be closing our eyes to great areas which confront us when we look at the human world. Furthermore, to hold to the beliefs, which seem to me to characterize many behaviorists, that science is impersonal, that knowledge is an entity, that science somehow carries itself forward without the subjective person of the scientist being involved, is, I think, completely illusory.

In contrast, the trend of which I am speaking will attempt to face up to *all* of the realities in the psychological realm. Instead of being restrictive and inhibiting, it will throw open the whole range of human experiencing to scientific study. It will explore the private worlds of inner personal meanings, in an effort to discover lawful and orderly relationships there. In this world of inner meanings it can investigate all the issues which are meaningless for the behaviorist—purposes, goals, values, choice, perceptions of self, perceptions of others, the personal constructs with which we build our world, the responsibilities we accept or reject, the whole phenomenal world of the individual with its connective tissue of meaning. Not one aspect of this world is open to the strict behaviorist. Yet that these elements have significance for man's behavior seems certainly true.

SOURCE: Carl R. Rogers, Toward a science of the person, *Journal of Humanistic Psychology*, 1963 (Fall), 72–92.

host of specific S-R associations each of which is either at full strength or at zero strength. A pupil, for instance, is studying a vocabulary list, trying to memorize such isolated pairs as "*la manche*—sleeve," "*la plume*—pen." He studies the list several times. What happens with each repetition? It is possible that each time around, each of the pairs gets a little stronger, just as with each blow of the hammer a nail goes farther into the wood. It is also possible, however, that each repetition works, not like the blow of the hammer, but like the shake of a piggy bank. In trying to extract coins from this hoard we give the bank several shakes, gradually increasing our loot. But any one shake does not bring a single coin farther and farther through the slot. A coin either emerges or fails to emerge.

in Approaches

Mathematical Elaboration

The motivation to engage in imitative behavior is the sum of two derived values, ϕ and ψ. The value ϕ is assumed constant during the trial and seems to represent an elemental neural excitability which has the property of summing E_1 and E_2 algebraically. If any "tendency to respond" to one observed response or the other remains, then $\phi \neq 0$. On each subsequent performance of R_1, the individual's tendency to perform R_1; ϵ'_1, increases; and the same for R_2. The algebraic sum of these two tendencies is ψ which changes on ensuing trials. Thus the summing of ϕ and ψ gives the residual effect of past trials and the change in that tendency on the basis of the present trial as these affect the probability that the *i*th person will imitate those making R_1 or that he will imitate those making R_2.

The distribution of ϕ in the group is unspecified, but if the number of people's ϕ do not distribute normally around zero, imitation is occurring. Said differently, if $N(\phi)$ is symmetrically distributed around zero, half of the members of the group will make R_1 and the other half will make R_2.

It should be clear that the probability for making R_1 is $P_1\ (\phi + \psi)$. Further, $P_1(\phi) + P_2(\phi) = 1$. Since the quantity ψ changes with time, the probabilities that the individual will make R_1 or will make R_2 tend toward unity as nearly all members of the group perform the same response. The change in ψ is shown by

$$\frac{d\psi}{dt} = A(X - Y) - a\psi$$

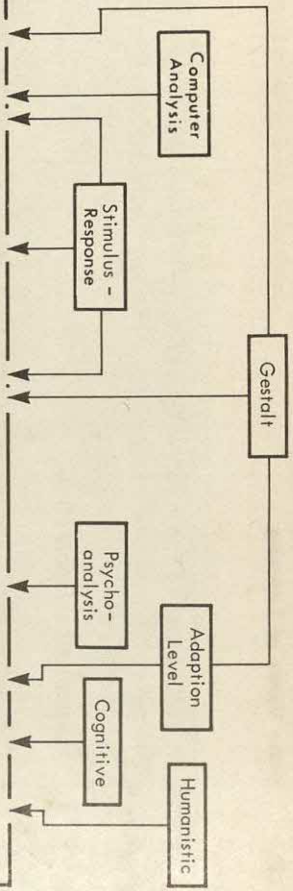
SOURCE: Helen I. Snyder, *Contemporary Educational Psychology: Some models applied to the school setting.* Copyright © 1968 John Wiley & Sons, Inc. By permission of John Wiley & Sons, Inc. (Rashevsky's Model of Imitative Behavior, pp. 101–102.)

Each shake merely gives it one more chance to reach complete success. It is possible that each repetition of the vocabulary list also merely gives any one pair a chance to become fully established. For that one item, then, further practice would serve no purpose.

From what we have said, it would appear that the practical educational yield from the mathematical theories is rather incidental and far from earth shaking. And at the moment, this impression is not too far from the truth. These theories are brought to your attention, not for their immediate practical payoff, but for their promise that some day they will enable you to make sense out of the many facts of learning. As the mathematical theories become more and more success-

Some Ancient but Continuing Issues

Stands Taken on Various Issues	1780	1800	1820	1840	1860	1880	1900	1920
To understand the whole picture, study the parts ??								
No:	Kant Reid				Hamilton			Koehler (Gestalt)
Yes: (For the most part)		E. Darwin	J. Mill		Bain J. S. Mill		Thorndike	Watson
Use the same explanations for men and animals ??								
Yes:					C. Darwin	Lloyd Morgan	Thorndike	Watson
Employ physiological explanations ??								
Yes:				M. Hall J. Mueller	Helmholtz	W. James	Thorndike	Watson Koehler
Use the logical-experimental approach to explain experience ??								
Yes: Energy systems (Physics)			Herbart				Freud	
Yes: Mental laws								
a. Perception				Weber	Fechner	Wundt Cattell		Koffka
b. Ideas and purposes			J. Mill		Bain J. S. Mill			Tolman McDougal
No: Would nullify Experience				Kierkegaarde				Jaspers



ful, and as you become equipped to understand them, there is a reasonable prospect of seeing these facts of learning, not as unrelated isolated events, but as inevitable and invariant items within a compact and elegant structure.

What To Think About the Rival Views

In this account we have stressed the variety of approaches available to anyone trying to get a better and more compact picture of the learning process. This variety or multiplicity is inevitably coupled with a sense of controversy or rivalry. To some extent each theory contends that "Anything you can do, I can do better." This aspect of controversy or rivalry should not be overstressed. Some aspect of it is present, however, and you must deal with it.

First of all, no one can tell you which attitude you should take toward the controversies within psychological theories. No matter what you decide, you will find many worthy and intelligent people agreeing with you. There are some thoughtful people who take an eclectic position and who remain almost completely uncommitted or open-minded. Others, equally astute, scorn this as a wishy-washy, uncommitted posture and insist that it is better to take the risk of being wrong than to accept the certainty of being ineffectual. Still others feel a fairly strong commitment to one view, or one approach, but make a point of remaining open to consider new evidence or new arguments.

Varying Values in Different Areas As you look over the different theories you may well feel that one is especially useful in dealing with one area of psychology but seems awkward and strained when applied to a different area. Humanistic psychology, for instance, arose from the age-old struggle to see meaning and significance in life. And to many people it has strong claims in this problem of fitting the immediate vital facts of life into a consistent and compelling pattern. It may be less useful, however, in helping us to understand why it is that one kind of concept is more difficult to grasp than another. Gestalt psychology, like its descendant, adaptation level theory, developed largely within the field of perception, and has been most productive in explaining the things that control our awareness of the world. Its contributions to an understanding of rote learning, although substantial, seem more labored and less immediately convincing. Stimulus-response psychology arose from the study of overt behavior, including the behavior of lower animals. For this theory, overt learning is the great phenomenon and in this area it has made tremendous contributions. Compared to the smooth going it has encountered in this area, however, its efforts to explain the higher processes of thought have seemed complex and unwieldy. Cognitive theory, on the contrary, started with the world of ideas and thoughts and has offered some convincing explanations of these matters. For a long time, however, it had little success in offering a persuasive account of mental disease and irrational behavior. Psychoanalysis, beginning with this failure of cognitive psychology, became perhaps the most ambitious of all theories in trying to explain the diverse areas of psychology. It was only after much labor, however, that students could detect any significant suggestions for ordinary academic learning. The more recent mathematical and computer-based theories provide marvels of precision and rigor, but do not pretend to carry these elegant methods to the humanistic understanding of man and his place in the meaning of things.

Honoring Personal Needs Many psychologists have been impressed by the fact that each theory seems to be natural and productive in one area but forced and almost trivial in another. This view of theories lends appeal to the eclectic approach in which one theory is used where it is convenient, but traded in for a different theory as a new problem is approached. In deciding whether such an eclectic attitude would do for you, you should take your own general inclinations and preferences into account. Is it easy for you to tolerate a good deal of uncertainty? Or are you easily upset by lack of certainty? Do you find yourself tempted to say, "Tell me, Doctor. Good news or bad. So long as I *know*." Even when you can tolerate a fair measure of uncertainty, does it reduce your effectiveness? Could you work zestfully and effectively to improve tomorrow's world, even if you had serious doubts that the world might be around tomorrow? Or must you feel, with a minimum of doubt, that you are on the right path before you can invest yourself in unreserved fashion?

If uncertainty, or an uncommitted attitude, should panic you, or render you ineffective, you would be wise to take a stand, realizing, of course, that this stand comes partly from your own temperament and not entirely from the objective claims of the theory you espouse. Such a stand will mean that there are facts you must minimize and arguments you must disregard. As in choosing a marriage partner, you may feel complete confidence in the wisdom of your choice, yet you may still be aware of the alternatives you dismiss, and the costs you will have to accept—however gladly. You need not dwell on these features of your decision, but you should not hide from them either. Honor your emotional or temperamental needs, but in doing so, don't deceive yourself into thinking that your decision was based entirely on logical or objective considerations.

If you can be happy and effective with an attitude of open-mindedness, you will clearly be more in accord with the objective situation. No one theory has been certified by any supreme court as being superior to all rivals. Many people adopt this eclectic position, seeing the usefulness of one approach, or one set of concepts, when considering one area of behavior, and the value of another approach when turning to other areas.

Summary

The teacher, like the nonteacher, will spend some time in theorizing about the things he sees. In any case, he will be forced by circumstances to have some dealings with theory. He should be familiar with the prominent theories that have been elaborated and scrutinized over the years. Such theories do not automatically guarantee success, but they add meaning and perspective to the work of the classroom. In the more systematic theories, there is a great urge to absorb as many particulars as possible into one general principle.

Any theory must start with some givens or unexplained assumptions and must ask the reader to accept these at the outset of the discussion. Obviously, there is much room for disagreement on where to start. Many theorists ask you to accept the familiar human wishes, ideas, or purposes as unexplained givens and go on from there. Others rely on the familiar "force-move" givens of physics and biology. The givens or basic assumptions of any theorist may be bizarre (e.g., a global unconscious mind shared by everyone) or familiar and easy to accept. These givens may also be set forth either as something real, but perhaps still unobserved (hypothetical construct), or as an intervening variable that could never be directly observed (e.g., the wish the dog is trying to express). The great urge for parsimony has led stimulus-response psychologists to try to explain mind in terms of physics, and to apply the same set of principles to animals and men. Both tendencies have been bitterly opposed by the humanists. For the stimulus-response psychologist, learning consists of changes in connections between stimulus and response, or in altering the probability that a response will occur.

Humanistic psychology and cognitive psychology start out with human attributes such as personal relevance, intentions, ideas, and expectations. For the cognitive psychologist, learning is the establishment of ideas or expectations of what response will bring about what effect.

Psychoanalytic theory, although deterministic and mechanistic in many ways, visualizes needs and desires propelled by psychic energy toward some outlet. This theory describes the processes by which the energy of the id is controlled directly by the ego, and indirectly by the superego. A modified form of this theory—ego psychology—holds that the ego not only controls the energy of the id but has energy and direction of its own. Gestalt psychology, and its kindred adaptation-level theory, emphasizes the patterns and structures which always dominate our experience, and into which any experience must fit. The melody has thus a pattern of its own irrespective of the key in which it is played.

Some of the theories now coming into prominence have little to say about man as spirit versus man as machine. In more prosaic fashion, these new theories, some of them modeled on the computer, merely go about the meticulous analysis of a task, trying to determine what factors must be present before the task can be performed. Mathematical theorists are concerned about assumptions which can be treated with precision, and which, thus treated, will fit in with carefully documented results.

The person with a high tolerance for uncertainty and ambiguity could adopt an eclectic or agnostic attitude toward the rival theories, picking and choosing to suit the problem at hand. Other people may need the feeling of certainty and commitment. These needs should be honored in deciding what to think about the many different theories.

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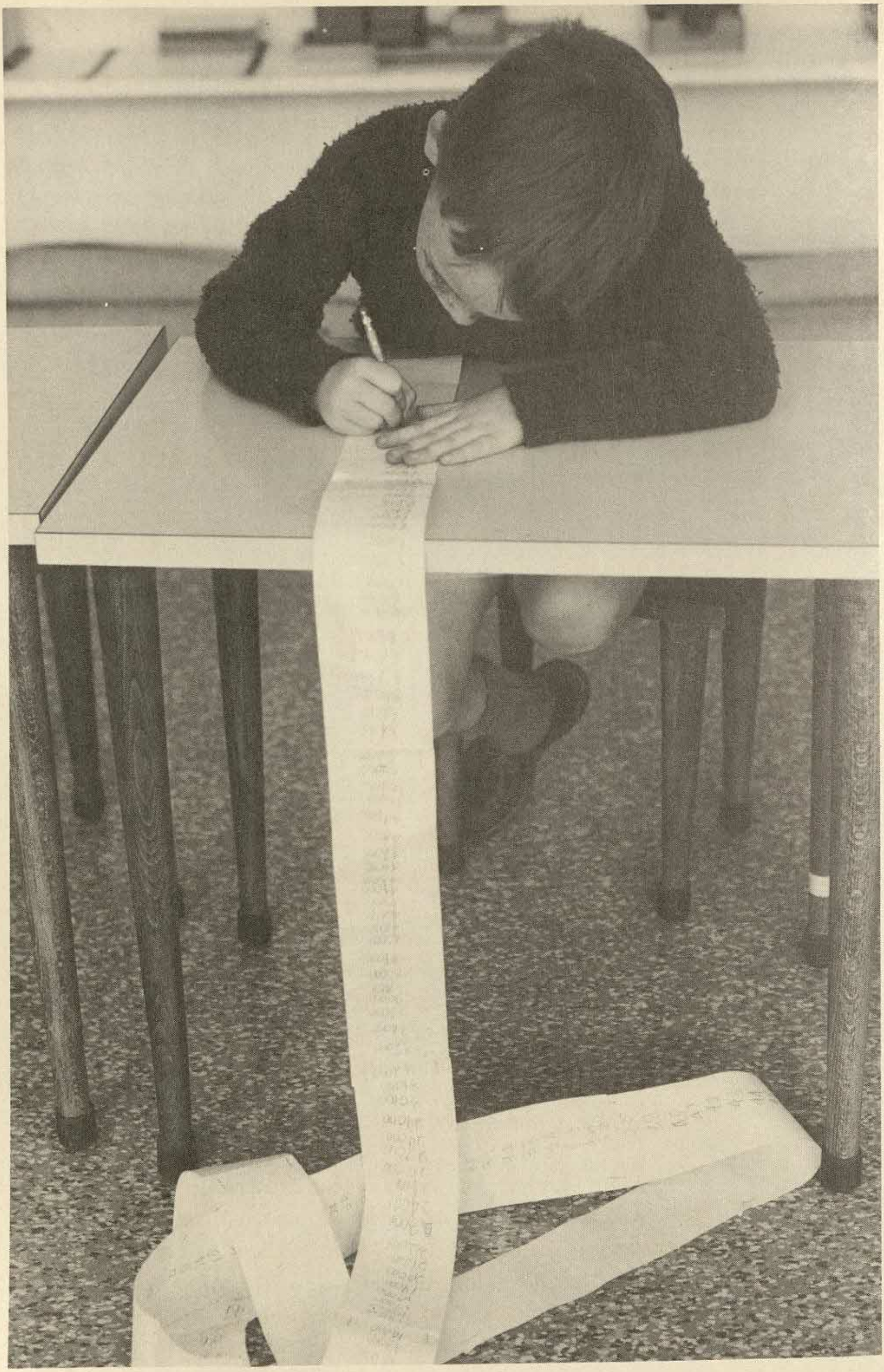


Suzanne Szasz

5

Motivation and Practice

The chapters up to this point have dealt with the students whom we are to teach and have also considered the basic principles which may govern the behavior of students and the way in which they learn. Now, with the developing student before us, we must take some practical steps to get him into the situation in which learning can occur, and to get him to perform the acts necessary for learning. These are the problems of motivation and practice.

Motivation, Learning, and Teaching

For the teacher, motivation is a crucial problem. For the psychologist, on the other hand, motivation is often regarded as an incidental or minor issue as far as *learning* is concerned (Underwood, 1959). Everyone admits, of course, that motivation is tremendously important in performance. You may have to use motivation to get someone to write a letter or to add a column of figures. Motivation may not be so essential, however, while he is learning to do these things. According to many theories, you will remember, learning is held to take place when the student becomes aware of an act and its consequence, or when he makes a response in the presence of a stimulus, or when he makes a response and encounters reinforcement. Provided that he does these essential things, he need feel no great urge or desire to learn.

But he must do these essential things, and to many learning theorists, the chief role of motivation is to get him to *perform* an act, and to get him to *attend* to the consequences, or to the situation that preceded it, or to the accompanying cues. Something must also be done to be sure that he is at least awake and moderately alert. Often something must be done to get him into the general situation in which learning can occur. These are tasks for motivation—tasks which the theorist can treat lightly but which the teacher cannot ignore.

Theories of Motivation

There have been many efforts to find a general description for the processes by which you are led to become alert, to do things, and to direct your attention to one thing rather than another. Behaviorists of the Skinnerian persuasion hold that the problem is fairly simple—some stimuli can make you respond by turning your eyes toward them, and by "attending" to them in sustained fashion. Other stimuli, at this moment, cannot. And how has this come about? Simply as a result of prior learning or, more specifically, from prior reinforcements (Keislar, 1960). While casually watching a television program, for instance, you see the caption "Special Bulletin" flash on the screen and hear the words, "We interrupt this program . . ." Other people in the group fall silent and look intently at the screen. You do the same, and your behavior is followed by interesting consequences. From these and similar reinforcements, you will become even more likely to act this way when such an announcement appears in the future. You have learned to give it marked attention, and to become alert and moderately tense when it occurs.

Other behaviorists, notably the Hullians, have made a distinction between a persisting motivational state, on the one hand, and a discrete event, on the other. In these views, motives arise originally from bodily conditions or physiological needs that require attention. Too much carbon dioxide in the system leads to frantic behavior and attempts to breathe. Diminished blood sugar leads the animal to move toward food and then to eat. When tissues are being injured or painfully distorted, there is much activity that may continue until the noxious substance is no longer in contact.

Eliminating the Drive Stimulus According to these theories, for each physiological *need* there is a corresponding *drive* mechanism. This drive mechanism often involves a drive stimulus such as a parched throat. This stimulus keeps the individual awake and moderately alert. It also makes him especially sensitive to one kind of object rather than another. And it keeps him doing one thing after another until—typically—the drive stimulus ceases to act. Stimuli that originally were rather neutral—such as a cold bottle of pop—are often paired with the primitive drive stimuli, and these themselves may come to have the same effect as the original thirst stimuli.

This physiologically oriented theory of motivation has encountered some difficulty (Cofer and Appley, 1964; Hilgard, 1963; Leeper, 1963). There is no denying the pattern of arousal, or tension, selective attention and varied activity continuing until the tension is reduced. But the process is not always closely linked to an identifiable physiological condition. The need to come to the aid of someone in distress, for instance, neatly follows the pattern but is not linked with a conspicuous physiological state.

Even when physiological components are quite obvious, this model or explanation may seem oversimplified. Motivated behavior is not typically the simple business of trying to brush off an annoying mosquito, or of obtaining relief from tension. In the operation of the sex drive, for instance, some of the early activity seems designed actually to increase the tension or arousal. In aggressive behavior we may also see some activity that serves to increase the feeling of anger. At times the organism seems to be deliberately working himself up to new levels of wrath.

A Search for Equilibrium Cofer and Appley (1964) suggest that, although something like tension reduction is in evidence, the general process more clearly resembles the equilibration notion of Piaget. There is some upset or disharmony. This leads to activity that continues until a new equilibrium is established. But this process does not necessarily mean regaining the precise equilibrium that existed earlier, or eliminating the condition or stimulus that upset the earlier equilibrium. Upon meeting an attractive girl, for instance, the young man may experience some tension and disequilibrium calling for activity. But the new equilibrium does not come from banishing the girl from his life but, more likely, from actually incorporating her into his life in a new and more inclusive equilibrated pattern.

The mechanism for achieving a new equilibrium is assumed to follow the TOTE model discussed in Chapter 4. Suppose, for instance, that you receive an unexpected visit from Aunt Hattie who is allergic to cats. As she appears at the door, several things happen: (1) A certain condition, or test question, comes to dominate your mind (cat out of the house?). (2) Some tension or concern develops. (3) A special program or TOTE goes into action by which you test to see if the cat is out of the house; do something if the answer is "No," and keep this up until the answer is "Yes." When the answer is "Yes" you exit from that loop (relax and start worrying about something else). (4) You become unusually sensitive to such things as open windows by which the banished cat could reenter the house.

The Occasional Search for Tension Even the theory of equilibration may have difficulty in explaining the behavior of people whom Maslow (one of the early contributors to humanistic psychology) describes as B-type, or self-actualizers. Such people, on occasion, far from avoiding tension or upset may actually seem to seek it. Perhaps, however, the ideal equilibrium is not complete quiescence. It may include a residual stirred-up state, like the slow-turning engines of a ship at rest. Such a built-in readiness for a new disequilibrium, or even a slight urge toward a new disequilibrium, would enable the individual to react more promptly to a new upset when this is forced upon him. When no external upset threatens, the same readiness may even invite, or seize upon, some potential, acceptable upset.

More than most people, Maslow's highly creative self-actualizers have reached a reasonable equilibrium with respect to fear, love, and esteem. They also have a fairly high tolerance for any lower-order disequilibriums that do remain. Adaptation-level processes have reduced these disequilibriums to a sort of neutral norm. To achieve the touch of restlessness needed for the superequilibrium, such creative people reach out for a gratuitous upset. They actually prefer ambiguous, complex experiences that call for the introduction of order.

Motivation and Other Forces in the Classroom

With our orientation toward practical classroom issues, we will concentrate on the general things accomplished by motivation, and will pay less attention to its inner nature or to the specific machinery by which its effects are achieved. For our purposes, motivation refers to a group of things we can do to keep pupils reasonably alert, to direct their attention to one thing, or one set of conditions rather than another, and to elicit a succession of responses that will continue until some predetermined condition has been met. The desired degree of alertness or tension will vary from task to task. Things should be arranged, moreover, so that the tension will ease off a bit when the predetermined condition is accomplished.

Motivation, of course, never works all by itself. Motivation and reinforcement (Chapter 6) are especially hard to disentangle. A child, for instance, has just given the correct answer to one question and we want to invigorate him as he attacks the next question. Any encouragement we now give him for this purpose may also do something else, perhaps reinforcing the answer already given. The distinction between the process of motivation and that of reinforcement lies not so much in the things that happen to the child as in the teaching task to be accomplished. If the teacher applies a stimulus to get the child to continue to give the same answer in the future, he considers himself to be applying reinforcement. If he applies the same stimulus to enliven the student, or to lead him to concentrate his attention, he would be regarded as using motivation.

The Mechanisms of Motivation and Their Management

It is clear that motivation has several facets and involves somewhat different but interrelated processes or mechanisms. We now consider the things that might be done to keep these mechanisms working at an effective level and to be sure that each mechanism is coordinated with the others.

Controlling Activation, Invigoration, or Arousal

Performance is at its best when activation or arousal is at a moderate level (Malmo, 1959). We should avoid drowsiness at one extreme and panic at the other. If we feel that our pupils are too indolent, we may have to arouse them a bit. If we feel that they are already too jittery or alert, we may need to induce a more relaxed condition.

As we all know, sheer physiology has a great deal to do with the general level of wakefulness, activation, or level of arousal (Duffy, 1962). Much recent interest in this problem, as a matter of fact, has been set off by the intensive study of one portion of the brainstem, the reticular division, that controls the level of arousal or degree of activation (Magoun, 1958). The activity of this part of the brainstem is closely related to the general blood chemistry which is, in turn, affected by fatigue, poisons, hormones, or drugs.

The physical environment also plays a big part. We are all familiar with the lulling effect of subdued and distant sounds. Monotony and regularity are the especial enemies of wakefulness. We are most likely to doze when the stimuli follow a rhythmic or predictable pattern, when there are no unexpected events to disrupt the pattern, when the broad and level turnpike brings no surprises. Drowsiness is especially likely to set in when we are listening to someone read, or listening to a mechanical recording. In this situation, the sounds often have less range or variety than when people talk spontaneously. Under these conditions we can safely predict that the reader or recording will present few abrupt changes in tempo or inflection. Wakefulness or arousal is brought about, on the other hand, by intensity, variety, or the threat of the unexpected. Even when the blood chemistry would bring about sleep, we can push people into wakefulness, if not into panic, by intense stimuli such as bright lights, loud noises, cold water, pain, or rough handling. To maintain wakefulness in the classroom, variety or the unexpected may be more feasible than sheer violence or intensity. A switch from one group of stimuli to another can work wonders. Pupils drowsing through a lecture may come awake with the mere introduction of another voice, as when a student asks a question.

The Problem of Response Competition The most extreme levels of panic or anxiety are always to be avoided. These are always unpleasant to experience and may have persisting ill-effects (Sears and Hilgard, 1964). Within these limits, the proper degree of arousal depends on the task at hand, and especially on the likelihood of *response competition.* In some tasks, such as learning to press the brake on seeing a stop light, there happens to be little response competition. The student can do the right thing, or he can fail to do the right thing, but there are not many wrong things that he is likely to do. This situation also occurs in experiments with the conditioned reflex. When the whistle sounds, the student can blink his eye or fail to do so, but there is little likelihood of other errors. When there is very little response competition, learning may be more effective with fairly high arousal, or moderate anxiety. Under these conditions, certainly, there is less need to worry if students are moderately tense or stirred up.

In many school tasks, in contrast to the example just used, response competition is quite marked. In first learning to type, for instance, there are many different responses you *could* make when you see the letter "a." In learning to

The Effect of Anxiety on Hard and Easy Tasks

College students (12 males, 17 females) were given a definition of trochaic meter in poetry. Then, without further consulting the definition, they were given selections of poetry and asked to decide whether or not each contained trochaic meter. On the basis of tests taken by other students, some of these were rated as difficult, others easy. An anxiety inventory and a test of blood pressure was administered to each student at various times during the experiment.

After reading the directions and being tested for anxiety, the students were given a group of difficult selections of poetry, received further tests of anxiety, and were then given the easy selections.

Anxiety scores rose markedly during the work on the difficult task, subsiding when the easy task was administered.

	Scores in Terms of Errors Made	
	Difficult Task	*Easy Task*
Students with high anxiety scores	19.1	14.8
Students with low anxiety scores	14.6	20.8

The difference in the trends (interaction) was significant at the 1 percent level.

SOURCE: Robert D. Tennyson and F. Ross Woolley, Interaction of anxiety with performance on two levels of task difficulty, *Journal of Educational Psychology*, 1971, 62(6), 463–467.

pronounce a foreign word, there are many wrong responses waiting to entrap the beginner. According to some theories, a high degree of arousal or anxiety would interfere with the learning of this material. And, for the most part, both the early experiments (Castaneda and others, 1956) and the more recent investigations (O'Neil and others, 1969; Goulet, 1968) have confirmed this theoretical expectation. With pronounced response competition, and high probability of error, anxiety or strong arousal could hurt in several ways. Under intense anxiety there is an urge to do *something*, and like the constitutionally impulsive child (Chapter 3), we may easily blurt out the first idea that occurs to us. With this kind of material, of course, our first idea is quite likely to be wrong. When we are highly anxious to begin with, moreover, there may be some relief merely from "knowing the worst" or in finding out that we are in error. This relief may serve as a reinforcement for the erroneous response.

What we have said about high arousal refers chiefly to immediate learning—to how well the student will perform immediately after practicing. Whatever he did manage to learn under high arousal, however, he may retain just as well as the things learned under low arousal (Kleinsmith and Kaplan, 1964). It is the immediate mastery of complex material that is harmed by high arousal.

Even with complex material, of course, the actual *de facto* response competition changes with an increase in competence. Anyone working on a typewriter, for instance, has many chances of striking the wrong key. For the beginning typist, moreover, this response competition is very real, and many of these errors are likely to occur. For the accomplished performer, however, response competition is largely theoretical. The errors, although possible, have little actual probability. As students reach a reasonable level of mastery and merely require additional drill to polish up their skill, we could afford to forget the dangers of response competition and could safely employ a high level of activation. Under these conditions there would be some advantage if students were moderately tense and if they experienced a mild touch of recital nerves.

But this high level of activation is valuable and safe only when dealing with material which, because of its nature or because of the developed competence of the students, presents little actual opportunity for error. For beginners in a complex task, it is most important to keep arousal or invigoration at a low level.

Worries About Listless Learning You may be somewhat disturbed over the prospect of cutting down the level of activation or invigoration. This may seem to go against everything a teacher should strive for. In our culture an indolent, apathetic classroom is not a pretty thing to see. As far as sheer effectiveness is concerned, however, there is evidence that in the beginning stages some learning can take place under such low activation. During the period of *exposure* learning (Sluckin, 1965) the young infant may learn something merely from having experience flow over him. Older people, while half asleep, and feeling little interest in what is going on, may pick up and retain jingles from television commercials. In sober experiments, people in bed and seemingly asleep will learn lists of words fed into their pillow speakers. This does not happen, we must hasten to add, when brain-wave records suggest that they really are asleep (Emmons and Simon, 1956). In trying to break a code or to work out a key to a complex puzzle, people often do better *at the start* when encouraged to adopt a relaxed, spectator attitude (Deese, 1958). This is treated in the discussion of incidental learning later in this chapter.

No one would suggest, of course, that you regularly aim at a classroom picture of yawning boredom. Whenever some competence has developed, and whenever response competition is low for any reason, vivid alertness and moderate tension may help. You should take steps to reduce activation, moreover, only when you feel that the existing level is already fairly high.

Controlling Attention or Directedness

Motivation works partly by making the student more sensitive to some of the things around him and less sensitive to others. We use motivation to get him to attend to what is on the board and to ignore the buzzing noise in the corridor. We try to make sure that one specified criterion, or one condition to be attained, will dominate his mind and that he will continue to test, to operate, and to test until the condition has been met (see Anderson, 1970).

Often we must go to some trouble to get the pupil's attention focused on one object rather than another. We must not always assume, however, that the more concentrated the attention the better. As with activation, there are times when the narrow focusing of attention could be overdone. At times the student may lose out by going single-mindedly down the course, keeping his attention fixed on only one thing and refusing to look to right or left. This excessive concentration on a single feature is especially likely to be harmful in the solving of problems or in carrying out creative tasks. In many routine school tasks, on the other hand, the student is more likely to suffer from lack of concentration and from yielding too readily to the distraction of incidental material. This failure to concentrate on a single aspect of the task is one of the things that characterize the underachiever (see Chapters 10 and 11). These students are assumed to be quite capable of mastering the material being studied, but they turn in a consistently poor performance. Upon analysis, they are found to learn just as many items as their more successful peers, but too many of the things they learn are incidental or trivial (Mondani and Tutko, 1969). Along with a smattering of the main points, they come up with a knowledge of page numbers, the location of illustrations on the page, and similar items.

Coordinating Activation and Attention

Very often activation and attention go hand in hand and the things we do to add to the one will also have some effect on the other. An unexpected bang at the chemistry table, for instance, will attract attention and will also induce activation. In milder fashion, the use of a prequestion will engage the student's attention and will also lead him to read a little faster. The sheer act of concentrating on complex material over a period of time, moreover, is likely to make people more anxious or tense (O'Neil, Spielberger, and Hansen, 1969). The converse is also true. While in the throes of midnight panic, for instance, you may find every ounce of your attention focused on the stealthy creak on the stair.

But these are things that often happen. They are not connections that are strictly necessary. At times you may be all keyed up and nervous but find that your attention is at the mercy of any chance stimulus. Conversely, we may see a person who is quite indolent, or almost asleep, but who keeps his attention directed to a single objective—avoiding an annoying fly or retrieving the blanket that keeps slipping off his cot.

For efficiency in most tasks, the two facets of attention and activation must be

When Distraction May Help

Some of the members of the Canadian Air Force were assigned to the monotonous task of printing a sequence of 7 pairs of letters, KT, LH, IM, XF, KV, TZ, IW, over and over again for a period of 42 minutes. The letters had to be printed on a tape that was advanced one line at a time at a fixed rate. Memory was not stressed, since the sequence was printed on a card and the subject could glance briefly at the card at any time. The task proved difficult, however, as the letters could easily be confused. Whenever a man thought he had made an error he was supposed to press a button with his foot.

To reduce the variation in stimulation as much as possible, the room in which each man worked was covered with a black drape. Outside noises were masked by the hum of a large exhaust fan.

After some preliminary experience, half the men continued to work under these quiet conditions. The remaining men, however, worked while a record of a speech was played backward. At times, short snatches of music, or intelligible speech, were added to this meaningless noise.

The men working with only the steady hum of the fan made 16.4 errors per thousand responses, whereas those working with meaningless noise made only 12.2 errors. The difference of 4.2 is significant at the 5-percent level. The latter group, however, were no more accurate in reporting their errors, reporting 55 percent of such errors as compared to a 56-percent report on the part of those working under quieter conditions. This difference of 1 percent is not significant.

SOURCE: W. N. McBain, Noise, the "arousal hypothesis," and monotonous work, *Journal of Applied Psychology*, 1961, **45**, 309–317.

more or less in step. An increase in one may cause trouble unless it is matched by an appropriate change in the other. In some rather monotonous tasks, for instance, attention may be at a reasonable level, but the student may be getting exceedingly drowsy. At this point we should do something to bring him to life, or to activate him, even if what we do might distract his attention from the task in which he is engaged. The attention is of little use unless it is matched by an appropriate activation level. For this reason it is not surprising to learn that for monotonous work a slight distraction may actually lead to an increase in efficiency (Slater, 1968; McBain, 1961). We see this when the high school student is doing his homework with jazz blaring from the radio. There is some interference with his attention, but this is more than overcome by the fact that he has a higher degree of activation.

We face a more serious problem of keeping the two facets in step with each other when we reach the higher levels of activation. When anxiety or threat is at a high level, for instance, students may pay more attention to the teacher or to some physical symbol of the threat than to the task on which it is important that they do well (Bloomer, 1968). Under these conditions, of course, it would be most desirable to reduce the level of arousal. When this is impossible, however, we should go to some trouble to see that the attention is directed to the basic task. The dramatic coach may say, "Don't keep looking at me to see how I am taking it. Concentrate on your lines." We could also try to sensitize the student to a small number of responses from which he really has to choose. ("All you have to decide is whether you push button A, or B, or neither.")

Motivation at Different Levels of Competence

We have already pointed out that the activation level should often be geared to the existing mastery of the material. The same holds true for attention and resistance to distraction. Consider the role of both attention and activation as they operate with the beginning piano player, on the one hand, and with the more accomplished performer, on the other. With the beginner, we may have to go to great trouble both to combat drowsiness and to keep his attention directed to the task at hand. If he has little genuine interest, we may wish to add some extrinsic motive such as the need for approval, or even a material reward. But we will keep the eagerness at a moderate level and will try to make sure that he is not too nervous or anxious. At this stage we will be especially careful to eliminate possible distractions such as an interesting conversation or a television program.

After our student has learned to play well, many of these matters can be ignored. The distractions against which we had to protect him in earlier times now present no problem. When he is really engrossed in his playing we may actually find it hard to interrupt him. There is little need to worry about keeping alertness within the narrow optimum range. He plays reasonably well within wide ranges of activation, when half asleep at one extreme, or in the panic of recital nerves, at the other.

Very often the skilled activity, originally induced by bribes or other extrinsic motives, later becomes a motive in itself. It becomes something which the student does for its own sake and which is now so attractive that it acts as an incentive for intermediate steps. Now the student may do many other things just for the pleasure of playing the piano.

One Activity as a Motive for Another As suggested above, one activity—playing the piano—may come to act as a motive for some other activity—going into the music room. Over the years, this theme has been stressed by a number of psychologists. Woodworth made much of the idea that a larger activity is typically the motive for a minor act. If asked, "Why are you taking the car out?" (specific act), the answer might well be, "Because I am going downtown" (larger activity). "Why are you going downtown?" "Because I am taking part in a meeting." And so on. One act serves as a means to another. Professor Gordon Allport showed how it is that an act—piano playing—may cease to be a means—to avoid a scolding—and come to be an end in itself. He holds that things like the piano playing may acquire functional autonomy (Seward, 1963). More recently, working in the field of reinforcement rather than motivation, Premack (1965) has held that taking part in certain kinds of activity does, in fact, reinforce earlier activity. To serve as a reinforcement (or reward) in this manner, an activity should be something that the child frequently does (the subjectivist would say, something the child likes to do). In Chapter 6 we return to this notion of one activity serving as reinforcement for another.

Specific Motives for Classroom Use

Having looked at the basic mechanisms that may be involved in motivation, we now turn to the practical steps that the teacher can take to bring these mechanisms into play. At this point we look at devices or procedures rather than mechanisms. Often, as we shall see, a single device or procedure may invoke several of the basic mechanisms.

Set, or Intention to Learn

Does it help when students know that learning is expected of them, and when they have a clear idea of what it is that they are expected to learn? Does it help if they themselves accept the assignment and definitely set out to learn the material? One student, for instance, is trying to memorize the streets he must pass in getting to his home. Another student, not concerned with this list, watches as the teacher writes on the board. Will the first student learn more than the spectator? Offhand, such a set toward learning would seem to be the simplest practical motive to use. For the most part, moreover, the answer seems to follow common sense. Very often students do learn more when such a set is at work.

Do Children Learn More When Told To Observe?

Children of age 8 years (24 boys, 24 girls), and of 14 years (also 24 boys and 24 girls) observed slides of objects and were required to say whether the object was a truck, a boat, or a plane, In the background of each slide there was an incidental object which, in half the slides, belonged to the same category as the main object (consistent stimuli), and in half did not belong (inconsistent stimuli). Half the children in each age group were told *to observe* what goes with what. Half were just told to watch. Later all children were shown these incidental stimuli one at a time. They were asked (a) if they had seen it on a slide (recognition), and (b) whether they could tell the kind of object it was associated with (recall).

Scores in Recognizing and Recalling Incidental Stimulus

Type of Incidental Stimulus	*Nature of Task*	*Younger Children*		*Older Children*	
		Not Told To Observe	*Told To Observe*	*Not Told To Observe*	*Told To Observe*
Consistent	Recognizing	6.7	7.9	8.2	8.2
Consistent	Recalling	4.7	7.0	7.6	8.0
Inconsistent	Recognizing	6.5	8.2	7.4	8.7
Inconsistent	Recalling	3.5	4.0	3.7	6.4

SOURCE: Alexander W. Siegel and David A. Corsini, Attentional differences in children's incidental learning, *Journal of Educational Psychology*, 1969, **60**(1), 65–70.

But there are some qualifications to keep in mind. For one thing, whatever the expectations of common sense, *some* learning may take place when there is no hint that learning is expected. On some few occasions, moreover, students learn a great deal under these free and easy conditions—almost as much as when they clearly set out to learn, and when they know just what the teacher expects.

Incidental Learning Unintentional learning, or *incidental learning*, has received much emphasis in psychology (Postman, 1964; Adams, 1957). Some of the best publicized illustrations of incidental learning come from the fields of behavioral shaping as carried on by Skinnerian psychologists. Simply by talking pleasantly to a child every time he approaches a certain table, a teacher can lead the child to remain in the vicinity of the table even though the child has no intention to learn to do this or has little conscious idea of his own acts or of the teacher's behavior. By similar unconscious shaping, the mentally ill are led to behave more adequately even though they may have had no intention of making this adjustment and have no idea that it is taking place.

At times, the results of incidental learning are quite marked. Students reading a selection with instructions to learn one thing may also learn other things quite irrelevant to their task. As pointed out earlier, this is especially true of children whose school performance is lower than would be expected from their performance in other areas. But it is also true for students in general. In one experiment (Meinke, 1969) college students were presented with a list of fifteen stimulus words. As each word was presented the students wrote down all the synonyms they could think of. When they finished they were asked to recall the fifteen stimulus words themselves. On the average, they recalled 3.2 of these words. During the same experiment a second group had originally been warned, "While you are thinking of synonyms for the stimulus words, try to memorize the stimulus words." These students, on the average, were able to recall 4.0 of the words, with no loss in the production of synonyms. The difference is statistically significant but obviously very slight.

A number of experiments agree in the suggestion that older students often learn almost as much when just told "to watch" as when told to study (Siegel and Corsini, 1969). Perhaps such older students, being a bit suspicious of psychological experiments, play it safe and give themselves instructions about what to learn (Farber, 1963). Younger students usually do considerably better when told what to learn. But even with young students there are limits to what we should expect. In one experiment in grade three, for instance, nothing was accomplished by telling the children to attend to the pictures in the film rather than to the sound. Such children recalled more auditory than visual events, and did so just as much when they were told to watch as when they were told to listen (Stevenson and Siegel, 1969).

Activity, Manipulation, and Effectance

When such primitive motives as pain, or fear, or hunger are not operating at an intense level, the need for activity may well be an important motive. We like to move things around and see things happen. White (1960) calls this the need for effectance. This is a powerful urge in animals, children, and adults. Rats are rewarded by entering a runway that is merely complex and interesting. In Harlow's (1953) classic experiments, monkeys regularly work hard to solve puzzles for no other reward than the pleasure of moving bolts and levers or of seeing a toy train going around on a track. Infants manipulate spoons, blocks, or paper with endless zest, and few of their elders can resist the temptation to "monkey" with gadgets, pinball machines, or other devices that produce interesting results.

Nor are these attractions limited to interesting physical manipulation. It is also fun to do crossword puzzles, to simplify an algebraic expression, to analyze a sentence, or to guess at the outcome of a story.

Many of these manipulative activities are followed by results that are immediate, consistent, and, at times, dramatic. Typically these results are impersonal, and the student can see that they arise from his doings and not from the whims or bad temper of the teacher. (Such awareness is discussed in Chapter 12 in relation to Intellectual Achievement Responsibility.) In the Montessori system (see Evans, 1971, pp. 42–43) there is great stress on the objective nature of the results from mechanical gadgets. Quick and interesting mechanical results also supply much of the motivation for teaching machines (Chapter 6), and for the talking typewriter and responsive environment developed by O. K. Moore (Marx and Tombaugh, 1967). In general, the teacher would do well to make use of these manipulatory motives whenever it is convenient to do so. In many ways they are more natural and wholesome than long-drawn-out exhortations, or nagging, or other verbal appeals.

At this point, of course, we are concerned with the use of these immediate results in keeping the student alert and interested. Such results also provide informative feedback and reinforcement for specific acts. These functions are discussed in Chapter 6.

Curiosity, Exploration, or Discovery

Along with the results that come from our own vigorous acts, there are other interesting and intriguing things that can be ours merely from looking or listening. And these have powerful effects in enlivening students, in engaging their attention, and in setting up end conditions that might be achieved.

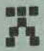
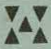
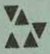
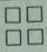
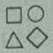
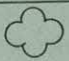
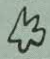
Curiosity is elicited by things that are novel, complex, or incongruous—by a new and elaborate gadget, for instance, that seems to defy the laws of gravity. Compared to familiar, regular, and simple objects, these "off-beat" arrangements are more likely to engage the children's attention and to provoke more spontaneous questions (Berlyne and Frommer, 1966; Berlyne, 1965). Piaget has made much of the child's efforts to keep these interesting or complex sights in view.

Curiosity, or the need to discover, should be a useful motive when the task eliciting the curiosity is relevant—when the child is supposed to solve the puzzle or manipulate the gadget. When the interesting or dramatic items merely serve as background, however, various things can happen. In one experiment (Marshall, 1969) kindergarten children were required to sort colored marbles into specially marked holes. The marble would drop into a cup when placed in the correct hole. The task was the same for all children, but for some children the apparatus was drab and businesslike. For others, it was decked out with pictures and bells that sounded when hit by the marbles. Lower-class children made a higher score when working with the interesting apparatus. Middle-class children, however, did better on the dull equipment. Perhaps the interesting surroundings may help if you have no interest at all, but may hurt if you are already inclined to cooperate in the task.

Curiosity Is Aroused by the Unusual

Each pair of pictures in the table is intended to bring out a difference of some kind. In the first pair, for instance, the lower picture has more material in it. In the second pair there is no difference in the number of items, but the first picture shows those items arranged in more regular fashion. The remaining pairs bring out differences in homogeneity and in regularity of shape.

Many pairs such as these were shown to college students, ten men and ten women. Each person was tested individually. During the test, a pair of pictures would be shown on a screen. Behind the screen, hidden from the student, there was an observer who watched the student's eyes and kept a record of the time spent in watching each picture in the pair. The experimenter made sure that each picture in the pair would be on the left for some students and on the right for others. He also made sure that the observer behind the screen did not know which picture was to the left or to the right.

		Average Number of Seconds Spent in Watching Each Type of Picture		
Type of Picture		*Simple or more regular picture*	*Complex or less regular picture*	
Less Material		3.4		
More Material			4.3	0.9 (Difference)
Regular Arrangement		3.4		
Irregular Arrangement			4.6	1.2 (Difference)
Similar Elements		3.2		
Diverse Elements			4.9	1.7 (Difference)
Regular Shape		3.1		
Irregular Shape			4.7	1.6 (Difference)

On the average the students spent a little over three seconds looking at the more conventional or more regular pictures and more time (4.5 seconds) on the less conventional designs. The difference in these averages was significant.

SOURCE: D. E. Berlyne, The influence of complexity and novelty in visual figures on orienting responses, *Journal of Experimental Psychology*, 1958, 55, 289–296.

Preliminary Questions

A teacher may often begin the lesson with a moderately puzzling question, hoping that, along with the production of a set, this feeling of mystery will enliven the student and keep his attention directed to the materials to be studied. Even when the element of mystery is lacking, a simple factual prequestion may also focus the student's attention on some feature of the material being studied and may also cause him to read that material more rapidly (Peeck, 1970). Rothkopf (1965) has included the use of such prequestions among his *mathemagenic* procedures designed to facilitate study. He also uses questions that follow the material being studied (these are discussed later). When prequestions are used, students will do better on a final test using the very same questions. They will be handicapped, however, on questions in the final test which cover the same material but with a change in the wording. This suggests that the prequestions focus the student's attention on the questions themselves and actually reduce the amount of attention given to related material. It is when the student is reading and preparing for a test, by the way, that the questions exert their influence. They have little effect either way when the student is merely reading with no test in mind (Frase, Patrick, and Schumer, 1970). Even when studying for a test, moreover, the student will not be influenced by these questions if he is already highly motivated as when working for a material reward.

In a very general way a global pretest covering a whole unit could have the same effect as these isolated questions interspersed in the material being studied. The effect of such pretests is discussed in Chapter 10.

Ego and Achievement Needs

Most people have a strong urge to see themselves as the kind of person who can, and does, accomplish something. This is somewhat different from the sheer pleasure of doing something and seeing something happen. The achievement need, or White's (1960) *competence*, goes beyond this. The person does not merely say "What an interesting result!" but also thinks "How clever of me to produce this interesting result!" This achievement need is seen most clearly in the student who must continually test himself and who is always ready to take on a difficult task merely because it is difficult. For such students, as McClelland (1953) and his associates have shown, it is often enough to know that it is hard to make a good grade on this assignment, or that a certain problem is considered insoluble. This trate on the problem itself. It is also obvious that this motive cannot be expected achievement or independence. This need for achievement can be enhanced, especially in boys, by pep talks or by stories of men who have succeeded in spite of serious handicaps.

It is possible, by the way, that this achievement need is too often neglected. When children complain about school, they are much more likely to complain that things are boring than that the subjects are too difficult.

Closely associated with a continuing need to test oneself are the persisting ego needs, the need to think well of oneself, especially in the areas of life that really matter. When a student can be made to feel that his performance on a certain task is a measure of his real worth as a person, he will exert himself tremendously (Kausler, 1951). For many college students such motivation can be brought about by the mere announcement that the assigned exercise is a dependable test of intelligence. Failure on a test that really measures intelligence is something that no student can contemplate with indifference.

There are numerous ways in which the teacher may enhance the amount of ego involvement experienced by the students. One method is to encourage the feeling of initiative. If the student feels that he thought of a project or an idea, he will feel more responsibility for it and will accept it as a part of himself.

Like other motives with the power to induce high arousal, this motive should be used with caution. There are times, indeed, especially in solving problems (Chapter 8), when much of the teacher's effort will be directed toward getting the student to forget about the quality of his own performance and to concentrate on the problem itself. It is also obvious that this motive cannot be expected to appeal to all cultures. In some areas of the world this achievement need is conspicuously lacking, and even in the Western world it may be powerful only in middle-class groups.

Meeting a Standard

One of the things brought about by a motivating state is the setting up of a conscious or an unconscious standard that must be attained, and to which our attention is directed. The cat must be kept out of the house. The annoying insect must be removed. The shiny car in the display window must be possessed. In many complex, deliberate activities we consciously seek some standard by which we can measure the adequacy of our performance. We ask "What are most people giving?" or "What is the ordinary tip?" We complain that we don't know what is expected of us ("If only I knew what you want!"). As soon as a standard is set, moreover, whether by automatic neural action or by a deliberate resolve, it exerts a powerful control on our behavior.

Typically a student's accomplishment will increase when the teacher announces a realistic standard to be attained. Many teachers set these standards on the basis of the student's previous work, boosting the new expectation by a reasonable increment. Presumably the student also sets standards for himself. When a student is provided with prompt knowledge of his performance—if he knows how far he has just jumped or how many words per minute he has just typed—this information helps boost his score on his next attempt. There is some evidence (Locke, Cartledge, and Koeppel, 1968) that this knowledge of results achieves its effect by causing the student to set a new standard for himself. This new standard then influences his performance. A student's performance improves just as much when the investigator merely gives him a new standard (based on previous performance) as when he is informed of the previous performance itself.

Apparently there is much to be gained from supplying students with short-term standards that are definite and realistic. Short-term knowledge of results, perhaps because it leads to new standards, has also been shown to be a dependable motive. By "short-term" we mean knowledge that can be supplied within a few minutes of the performance. The student is especially likely to try harder when the knowledge is immediate and definite. A student squeezing on a bulb will squeeze harder when a pointer is used to show the score that is reached. Students keeping a graphical record of the scores in arithmetic or typing will usually perform better on the next test.

Providing knowledge of results is an excellent way of motivating students to apply themselves to the task at hand. It is an honest, intrinsic form of motivation, calling for no elaborate pep talks or farfetched rationalizations. It is a fairly safe method. Knowledge of our previous performance tends to make us compete against ourselves. And for most of us, this is a contest in which we can hope for considerable success. We are not asked to match the record of the best student in the class or some unattainable ideal. We are merely asked to beat our own previous score.

When the results of each act are not automatically revealed, deliberate steps should be taken to make the knowledge of results as definite and immediate as possible. By the use of tape recorders, students can often hear their pronunciation of foreign words played back to them. Sometimes students can mark their own papers from a model as soon as they finish their exercises. There is some evidence that students also profit from examining test papers that have been marked by the teacher (Berglund, 1969). Ordinarily, however, this involves a considerable delay.

The Long-Range Urge for Success

Along with the urge to show up well on the task immediately at hand, there are the long-term urges to get a good grade at the end of the term, to do well on the finals, and even to make a success out of life. These long-range aspirations undoubtedly provide powerful motivation for large-scale decisions—whether or not to sign up for this course, to attend college, or to enroll in job training. It is questionable, however, if they have a comparable influence in determining whether, right now, George will watch the chalkboard or look at the birds fighting near the window, or whether he will be energetic or lethargic as he begins his algebra assignment.

Suspecting that these distant events may have little impact, many investigators have suggested that frequent examinations or quizzes should be more effective than a single midterm examination followed by a final. At the college level, however, this has turned out not to be true. Almost a score of studies (Brown, 1968; Olsen, Weber, and Dorner, 1968; see also Stephens, 1967) show little or no

Do Frequent Quizzes Help?

The groups in this experiment consisted of four sections in a course in educational psychology. Students had been allowed to choose their own sections whenever schedules permitted. The students in the different sections did not differ significantly in age, sex, intelligence, or general class standing. All were taught by the same instructor. All four sections were given a pretest, a midterm test, and a final. One section, the control, had no further tests, but the other three sections were given a total of 13 weekly quizzes, or activities of a quiz nature.

Procedure in Weekly Quiz Period	*Possible Contributions from Each Procedure*	*Mean Score on Examination*		
		Pretest	*Midterm*	*Final*
Group A, 30 students Traditional: Instructor grades and returns papers, keeping a record	1. Increased familiarity with subject 2. Knowledge of results 3. Desire to get good grades on quiz	33.9	66.2	101.7
Group B, 28 students Papers graded and kept by students. Not seen by instructor	1. Increased familiarity with subject 2. Knowledge of results	34.9	63.9	94.4
Group C, 14 students No real quiz. Instructor merely reads out the questions and gives the answers	1. Increased familiarity with subject	36.5	59.7	97.5
Group D, 32 students No weekly quizzes		33.9	59.4	92.4

The midterm results were corrected (analysis of covariance) to allow for the observed differences in the original test. On these corrected scores, Group A was significantly ahead of Group D. No other midterm differences were significant, and none of the differences in the final examinations were significant.

It would seem that the quizzes had no lasting effects. Some conditions may have had a transient effect.

SOURCE: L. W. Standlee and W. J. Popham, Quizzes' contribution to learning, *Journal of Educational Psychology*, 1960, 51, 322–325.

advantage for a program of frequent quizzes as opposed to a single midterm examination. At the high school level there may be a slight advantage from tests given every two weeks or so. Daily tests, however, seem less effective than those two weeks apart (Stephens, 1956, p. 301).

Social Motives

School children have their full quota of needs to be with people, to be noticed, to receive affection, and to be approved. These interactions with other people have traditionally been considered to play a great part in classroom motivation. Young pupils, especially, look to the teacher for emotional support of this kind. There is some confusion in the evidence regarding the effect of the teacher's supportive influence. Older students perform better when corrected assignments contain notes suggesting that the teacher has really taken an interest in the student's paper (Page, 1958). Younger children assigned to a supportive teacher, moreover, develop a more wholesome self concept. Such children, however, show no superiority in ordinary academic work or in creative tasks (Sears and Hilgard, 1964). This latter finding, however, may not be as surprising as it seems at first glance. Inherent in the concept of motivation is the idea of failure. When you attempt to solve the problem you may succeed or you may not. When you set yourself a standard, your next effort may attain it or may fail. Whether or not you attain the goal or meet the standard depends on what you do. Teachers who are strongly supportive, however, may offer this support in unconditional fashion. It goes out to the loser as much as to the winner. No special behavior is required to attain it. One might expect from adaptation-level theory, as a matter of fact, that after a steady supply of emotional support, a moderate degree of support might seem insufficient. Certainly children associating with warm, approving, and demonstrative teachers have been observed to make pronounced bids for the teacher's attention (Rosenthal, Underwood, and Martin, 1969).

Watching and Being Watched Merely being in the presence of other people and being observed by them has some effect on performance. These effects are linked to the degree of arousal. With easy tasks, performance is speeded up by this social factor and with little increase in error. With complex tasks, output may be reduced and the quality of the work tends to suffer.

The presence of a model or pacesetter also has an effect. Many children tend to imitate an impressive adult (Bandura and Walters, 1963). When the teacher himself concentrates on divergent thinking (see Chapter 3) instead of convergent thinking, and when he makes a big thing of it, he can get his pupils also to do more in the way of this divergent thinking (Sears and Hilgard, 1964). In watching a proficient classmate working at the chalkboard, the students at their seats will work more rapidly but no more accurately.

Competition When students really do compete, the level of arousal is raised and produces the expected effects. With well-practiced tasks, involving little risk of

Making Decisions While the World Looks On

In this experiment a college student, working alone with the experimenter in a small laboratory, was shown a phrase such as "a musical composition." As soon as he had read the phrase, the experimenter showed him a pair of words such as "concerto-symphony." The student had to decide which of these two words best fitted the phrase he had just read. Unknown to the student a record was kept of the time he took to make the decision. Each student was given some choices that were easy and others that were hard. Some choices were relatively neutral or objective; others made room for preferences, fears, or prejudices.

The laboratory had a large sheet of glass in one wall, and this made possible different audience conditions for different students. Under one condition the student could easily see some four or five people watching him from behind the glass and he knew that they were also listening. Under a second condition the lights on the glass were arranged so that the audience could not be seen, but the student was told about this unseen audience behind the glass and he knew he was being observed. Under the third condition the glass was covered by a curtain, and there was neither an audience nor the suggestion of one. In all, 120 students took part, 20 men and 20 women working under each condition.

The results shown in the table were obtained for the *first half* of the experiment.

	Time Taken To Make a Choice		
	No Audience	*Seen Audience*	*Unseen Audience*
Difficult Choices, Personal Tone	179	204	248
Difficult Choices, Neutral Tone	178	207	254
Easy Choices, Personal Tone	137	168	171
Easy Choices, Neutral Tone	117	119	150

In general, the differences between "no audience" and the "unseen audience" were significant at the 5 percent level. The other differences were of questionable significance. These differences did not hold up for the last half of the experiment. Apparently the students adjusted to the audience condition.

SOURCE: S. Wapner and Thelma G. Alper, The effect of an audience on behavior in a choice situation, *Journal of Abnormal and Social Psychology*, 1952, 47, 222–229.

error, output is markedly increased. Working in New York schools, for instance, Maller (1929) urged grade six children to see who could make the greatest gain in adding number couplets. The class gained some thirty-two examples. This is more than the total gain that ordinarily takes place between grades five and eight. Of course, their skill did not increase that much. They merely made better use of skill they already had.

In the experiment just mentioned, it was found that individual competition was much better than group competition. The children performed at a higher level when each child was trying to excel all other children. When, on the other hand, one class was trying to excel another class, the influence of competition was less marked. Group competition was fairly effective when a group of boys tried to excel a group of girls. The whole problem of competition is highly controversial, of course, and has proved difficult to investigate in an objective fashion (Myers, 1962).

Cooperation as opposed to competition has been found to facilitate creative production (Torrance, 1971). It has also worked well for certain kinds of cooperative pairs in computer-assisted instruction (see Chapter 6).

As contrasted to cooperation, the competitive situation may make older students unduly cautious in the important process of setting new standards for themselves. In one experiment (Kogan and Carlson, 1969) college students worked on problems of varying difficulty. The more difficult problems carried a higher monetary reward. When small groups were governed by group consensus, and shared the reward, they were likely to move on to more difficult (but reasonable) problems. When competing as individuals against the other members of the group, they were more likely to stay with problems at the same level. Students in grade five, in contrast to the college students, however, were just as likely to attempt more difficult problems under competitive as under cooperative conditions.

Praise and Blame In the extreme case of social approval or disapproval, the teacher overtly praises the student for his good work or administers a reprimand for poor performance. With extremely good luck we may be able to manage things so that there will be little occasion for blame. Under ordinary circumstances, however, we are bound to encounter work that is a mixture of good and bad. At this point, we cannot be sure whether praise or blame will have the greatest effect in bringing about an improvement in the future. The reports (Schmidt, 1941; Murphy and others, 1937) of the earlier material reveal a great deal of inconsistency from one study to another. Later studies (Grace, 1948; Thompson and Hunnicutt, 1944) have not completely eliminated the confusion, but support the commonsense belief that blame may bring more arousal. At any rate, blame seems to be harmful for people who are very tense to begin with. Blame may have a valuable effect, however, for people who are too easygoing or lethargic. There is some evidence to support the commonsense notion that what will work for one teacher might not work for another. In general it would seem wise to let nature take its course, avoiding undue reliance on either praise or blame. In the long run we might aim at a balanced diet with success and praise predominating. On the occasion of a lapse, however, we might very well act in a way that seems natural, perhaps ignoring the lapse, perhaps administering a good-natured, but definite, rebuke.

Using the Expressed Interests of Pupils

There is a difference between the basic needs by which people are moved on the one hand, and the expressed interests or concerns on the other. However fiercely he may feel the urge, the child does not go around freely discussing his need to be loved or to gain the approval of others. He does talk freely about baseball, science fiction, or TV programs. These are examples of the child's expressed immediate interests, derived, no doubt, from his basic needs, but not directly expressing themselves as such.

In the general discussion of education there has been much concern about the importance of utilizing and honoring the existing interests of children (Evans, 1971; Marx and Tombaugh, 1967; Cremin, 1961). This has been a persistent theme, seen in Herbart's pedagogy of a century and a half ago and reappearing in the contemporary writing of John Holt (1967). But the general idea goes beyond the scope of this book. It is too large and inclusive to lend itself to a precise psychological investigation. Common sense would suggest that there is much to be gained if you can link the physics lesson to the student's existing interest in photography, or if you can show the connection between ancient classical folk songs and the rock-group outpourings of today. But the evidence is limited. In trying to predict how much arithmetic a student will learn at the end of the term, it does not help a great deal to know his attitude toward arithmetic at the beginning of the term (Neale, Gill, and Tismer, 1970). If we look at his attitude at the end of the year we will find, true enough, that those who have learned the most like the subject best. But from such evidence it is impossible to tell whether interest breeds success or success engenders interest.

Intrinsic versus Extrinsic Motives

At any given moment, the child's expressed interests are intrinsic motives. The only way he can satisfy this interest is to know more about the subject itself. Extrinsic motives, on the other hand, permit *detour behavior*. When the motive is merely to get a good grade on the test, for instance, the student might find roundabout devices to obtain this result. If he chose he could memorize old exam papers, drill on isolated details, or, in desperation, even cheat. Obviously there is a marked advantage in using intrinsic motivation whenever it is available. But this is not always feasible in the busy classroom, and ordinarily it would be better to use an extrinsic motive than to do nothing. It is always possible, moreover, that an activity, such as reading, originally induced by an extrinsic motive, may develop functional autonomy and become attractive in its own right.

Material Incentives

At times the extrinsic incentive consists of money, or candy, or a toy. When college students are given an assignment and are told that they will get ten cents for each correct answer on the final, they will learn much more than if they are merely told to try hard, or if they are promised lesser amounts. The appeal of the ten-cent reward, as a matter of fact, may be so great as to wash out the influence of other motives such as the use of prequestions (Frase, Patrick, and Schumer, 1970). Younger children from lower-class backgrounds also seem to work harder, and to accomplish more, when working for a prize—a box of crayons, for instance (Benowitz and Busse, 1970; Higgins and Archer, 1968). The evidence is by no means consistent, however. Young children, for instance, seem to work no harder for a prize that they are known to value than for one that they do not prefer (Cartwright, 1970), even though they may spurn the low-valued prize when it is actually presented. In one experiment with kindergarten children (Marshall, 1969), the use of material rewards actually hindered performance. In this experiment, mentioned earlier, the children discovered their success each time a marble rolled into a cup. Some children were allowed to trade a cupful of marbles for a toy. They then returned to the task. Such children took longer to learn than those who merely worked for the marble. This interference seemed to be especially pronounced for children who take kindly to schoolwork anyhow, even without rewards—girls from middle-class homes, for instance.

Interaction with Social Class

At several points it has been suggested that various motives may have one effect on middle-class children and a different effect on children from the ghetto. This fact has been stressed by many writers on the subject (e.g., Sears and Hilgard, 1964). The achievement motive, for instance, may have a powerful appeal to children from one cultural setting. Members of the current youth culture, however, might be jeeringly amused when urged to work for personal success, and children from the ghetto might be merely bewildered. Trinkets may have an effect on impoverished children but may be haughtily brushed aside in other neighborhoods. Students receiving feedback from their performance will set new standards for themselves provided that they are engaged in a task they consider important or in a task that has a claim on their regard. For the ghetto child, however, many school tasks may seem weird and possessed of little relevance for the "real me." For such a child there is little motivation from merely knowing how well he is doing in this irrelevant task.

Activity and Practice

One of the functions of motivation is to induce students to perform the acts necessary for learning. They should attend to the material in question and they should make some response. We consider the kinds of activity that might be brought about and some of the processes involved in each.

Reading

In some school situations a first glance might fail to detect much activity of any kind. A closer look, however, shows such activity to be present in a very lively fashion. A student quietly reading a book, for instance, really is very active for all his seeming immobility. Having read (attended to) the first part of the sentence, he is almost bound to run ahead a bit and guess at the next few ——— (words). When his eyes catch up, he finds out whether or not his guess was correct. This is typical in all reading. In fact, one very good way to judge the "readability" of a given selection is to find out how well the typical student can guess or anticipate the next word or so when you stop him in the middle of a sentence (Rubenstein and Aborn, 1958). If he can anticipate too many words at any point, the reading becomes boring and too easy. But if he can't anticipate any words, he will find the reading quite difficult.

The reacting that goes on in reading is not only this business of guessing what is coming next. As a matter of fact, this is probably the simplest and most mechanical form of reaction. We do other and more interesting things as well. Reading about present-day speeds across the Atlantic, for instance, the student may think of many other things—the time taken in the past, probable speeds of the future, or a host of other items. An author may take pleasure in trying to make us think of something that he doesn't quite say, as when he *speaks* of the Bard of Avon but forces us to *think* of Shakespeare.

The inherent activity that accompanies reading can be supplemented by incorporating exercises or questions into the text. We have already considered the use of prequestions designed to focus the student's attention and to arouse his interest. Along with these prequestions, Rothkopf (1965) has also suggested using postquestions based on short sections just read. Through reading such questions, students will often improve their performance on identical questions when they appear in a final test. Unlike the prequestions, moreover, these postquestions do not handicap the student when he is tested on similar concepts expressed in other words (Frase, 1968). Often a specific postquestion improves a student's performance on a different new question covering the same material. The value of such postquestions is especially marked when other kinds of motivation are at a low level. When students are highly motivated by other means, the postquestions help very little (Frase, Patrick, and Schumer, 1970).

Instead of working with questions already prepared, students may be urged to construct their own questions based on the material just read. This technique plays a part in many programs aimed at improving study habits (Robinson, 1962). Such programs, as a whole, tend to improve performance. We cannot be sure that this technique all by itself will make for better performance, but the program as a whole does help.

Listening

You will not be surprised to learn that students spend much time in listening, either to the teacher or to each other (see Chapter 1). Listening is very much like reading except, here, the timing is under the control of the speaker. As in the case of the reader, the listener is making many silent responses to the statements he hears. The lecturer should allow for these many silent responses. When he introduces a novel idea (and surely many of the ideas he introduces will be somewhat novel) he should not pass over this idea too quickly. He should linger over it, repeat it in slightly different words, state it this way and state it that way, and dwell on it for some time. By thus holding the idea before the students for a considerable length of time, and holding it before them in a stimulating way, he permits them, and, indeed, actually impels them, to make several reactions to the idea. One of these responses has a chance of being the right one.

Listening, like reading, is often accompanied by more overt activity, such as note-taking, or answering brief questions, followed by a review. The value of the

The Effects of Taking Notes and Reviewing

Six groups of 10 college students each listened to a tape recording of a 160-word passage from a novel. Two of the six groups were told to try to make a verbatim record while listening. Two other groups were to make brief notes, whereas the other two groups were told to take no notes at all. For 3 minutes after the tape finished, one group from each of the preceding conditions was told to review any notes made, whereas the other group read a different passage of prose. Fourteen days later all six groups were asked to recall what they had heard. The scores were as follows:

	Review	*No Review*
Verbatim notes	3.3	0.6
Brief notes	3.7	1.0
No notes	2.9	1.2

In general the difference between review and no review were significant. The differences for different note-taking conditions were not significant.

SOURCE: Michael J. A. Howe, Note-taking strategy, review and long-term retention of verbal information, *Journal of Educational Research*, 1970, 63, 285.

interspersed questions is still somewhat uncertain (Berliner, 1969). There is some advantage from a few minutes spent in review, but note-taking during this review makes little additional contribution (Howe, 1970).

Class Discussions

When a discussion is going on, some of the students will make their reactions out loud, and in those cases the teacher can quickly tell whether or not those students are on the right track. But he can tell only about the student who has just spoken. Each of the other students also makes silent reactions to what the instructor has said. Each one is also making some reaction to the student's contribution. It may happen that the student who first makes a comment may be completely off the track. His comments, in turn, may elicit reactions from other students, some out loud, others silent, that are even further astray. This complex interaction is very hard to control. Many an instructor finds it easier to control the host of silent reactions of the students when the instructor himself is doing most of the talking.

The management of a discussion is a tricky business. In spite of the expected advantages of the discussion method, indeed, the typical college instructor gets no better results from the discussion than he does from the lecture method (McKeachie, 1963). We have little evidence of how the two approaches compare at the high school level. It would be natural to suppose, by the way, that it is chiefly the "communicating" student who profits from discussion. For the silent student, who merely listens anyhow, it may be better to *listen* to the typical instructor than to *listen* to the typical fellow student. Whenever we do use the discussion method we should keep this in mind and try to be sure that as many students as possible take part. (See Chapter 15 for a discussion of the related problem of the group-centered approach.)

Answering Questions

In the classical recitation session, selected students are required to deal with questions posed by the teacher. At the elementary and secondary level the typical teacher will ask from 100 to 150 questions per hour, or 350 to 400 per day (Gall, 1970). Some of these questions (see Chapter 1) are brief, and are designed simply to keep the student responding ("Anything to add?") or to involve another student ("What do you think, Sue?). Others are really instructions in question form ("Why don't you do it this way?"). Many, however, call for definite substantive answers, either in the way of factual information or direct recall from the textbook—still the single most frequent kind of question—or in the way of evaluation, or of analysis, or of extending an idea into some other area. There is some hopeful evidence that by using questions that call for analysis or interpretation, teachers can increase the performance of the students in tasks of this kind (Hunkins, 1968).

Lecture vs. Discussion

For one division of a class in college mathematics, the instructor taught two small sections of 20 to 30 students each, using the lecture-discussion approach. Each section met for three such sessions each week. The instructor also met the students in smaller groups for a one-hour laboratory session each week. Later in the year the same instructor taught 70 students in one large class. He used the straight-lecture approach. There were 3 lectures per week supplemented by *two* one-hour laboratory sessions meeting in small groups. Unlike the previous class, these latter laboratories were led by student assistants.

Achievement was measured by an objective test covering manipulation and understanding of mathematical concepts, and by an essay test on the nature of mathematics. The mean scores at the beginning and the end of the course are shown in the table.

	Objective Test			*Essay Test*		
	Initial	*Final*	*Gain*	*Initial*	*Final*	*Gain*
47 students taught in small lecture-discussion group	115.6	192.8	77.1	17.0	22.7	5.7
59 students from the large lecture class	113.9	187.8	73.9	18.6	24.9	6.3
Advantage for small classes			+3.2			−0.6
Neither of these differences is significant						

In a poll of student opinion, the instructor received a higher rating from the students who were taught in small sections. The laboratory sections accompanying the large sections were rated more favorably than those accompanying the small classes. Both procedures were rated as better than the college average.

SOURCE: Ruth Churchill and Paula John, Conservation of teaching time through the use of lecture classes and student assistants, *Journal of Educational Psychology*, 1958, 49, 324–327.

An Ordered Sequence of Tasks

Many programs insist that the activity undertaken by the student shall follow a careful sequence. The Montessori method invokes an elaborate program of steps, or stages (Evans, 1971; Marx and Tombaugh, 1967). And the very phrase "programmed learning" emphasizes the systematic nature of the experiences presented to the student in these educational ventures. Gagné's work (1970a) calls for the careful development of lower-order skills before these are called into play in more complex activities. We go into these matters in more detail in Chapters 6, 7, and 10.

Type and Amount of Practice

In the learning of acts of skill such as in juggling, tennis, or dart throwing, there is some suggestion that imaginary practice, carried on apart from the task, will make some contribution (Richardson, 1967). Students engaging in this mental practice often tense their muscles and make the necessary movements in reduced fashion. Many of them report fairly vivid images of the stimuli to which they are responding. After working on a task that involved remembering the order in which objects were placed, children in the early grades were observed to go in for "pointing" when away from the task (Daehler and others, 1969). In this experiment, however, the gesturing did not help on later performance.

Verbal rehearsal while away from the task is quite usual, and psychologists have always assumed that such silent practice may have pronounced effects. In the Daehler (1969) experiment, for instance, verbal rehearsal, in contrast to the gestural "pointing," did lead to better performance on a later test.

Some practice, or some experience with the material to be learned, is, of course, essential. But we should be cautious in assuming that since some practice is good, more practice is better. As was pointed out in Chapter 4, this has been seriously questioned. In one classical and provocative experiment, Rock (1957) had students attempt to memorize pairs of words such as one finds in a vocabulary list. Each student read over the list of pairs once and then tried to give the second (response) word of the pair as soon as he saw the first (stimulus) term. Each student would get some pairs right on this first test but would miss a good many others. Rock kept the pairs that were right but took out all that were wrong and substituted completely new but comparable pairs. The student would then read this new list made up of pairs already learned and other pairs seen for the first time. A test followed this reading, and again Rock made up a new list containing only successes and new pairs. Under this procedure, if the student was to learn a given pair at all he had to learn it the first time he saw it. If he missed it he would never see it again, but would encounter a new pair on the next trial. Here, then, there was no chance for practice or repeated experience to operate in the learning of the pairs. Yet students working in this way did just as well as comparable students who saw the same pairs over and over again.

As you might imagine, there has been a great deal of controversy over the implications of Rock's experiment (Jung, 1968; Postman, 1962; Lockhead, 1961). It has been suggested that in this experiment the student automatically finds that the easy items are learned on the first trial. The items that are hard for him are not mastered on this trial. In his second list these unlearned (hard) items are dropped out and are replaced by random, or average, items. In this way, each new list is somewhat easier. When allowance is made for this selective factor there may be evidence that additional practice may help.

The results of experiments on one-trial learning are too complex to permit us to say whether all learning occurs on a single trial, or whether each trial may add somewhat to the strength of each response. Those results do suggest, however, that repeated practice may not be the crucial factor in learning, provided that the basic mechanisms are free to operate in early trials. Long before Rock's provocative experiment, Rice, in his pioneering investigations, had shown that beyond a certain minimum there is little to be gained from extending the amount of practice in spelling, writing, or English composition. In any case, practice can do nothing in and of itself. At the very best it can merely provide the occasion in which other forces such as reinforcement or insight can come into the picture. These other forces frequently do come into the picture when practice is provided, but unless they do, additional practice will accomplish very little.

All this, of course, has to do with immediate mastery. Later (Chapter 9), when we consider the matters of transfer and retention, we will find that things are more complicated. A factor can have one effect on immediate achievement and a quite different effect on long-term retention.

Summary

Although psychologists are not sure of the part motivation plays in the essential process of learning, there is no doubt that the teacher must be sure that the student performs some act, that he remains reasonably alert, and that he directs his attention to some things rather than others. The tendency to do these things may be the outcome of other learning, or may arise from basic need states, either physiological or mental. Like the equilibration process stressed by Piaget, the mechanisms of motivation, in conjunction with other mechanisms, serve to establish some harmony with the world of experience. One of these mechanisms, activation or arousal, should be at an intermediate level, especially when there is high risk of error. The risk of excessive attention, although present, is less pronounced. When arousal is high, close attention is also desirable. These matters become less worrisome as competence develops.

Within the classroom, intention to learn serves as a motive, but much incidental learning takes place with little overt intention, especially in the case of older students. Manipulation, or effectance, or the drive to produce effects, is a powerful motive and is used in many popular educational programs. The closely associated drive of curiosity or exploration is also useful in schoolwork, although it occasionally results in distraction. Preliminary questions may bring activation and attention but may focus too much attention on the specific questions themselves. Achievement needs are powerful motives in some cultures, and the need to think well of oneself (ego needs) are effective with most groups, and these are invoked by seeing one's performance in relation to standards to be met. The school invokes social needs, such as the need to help or be part of a group, the need to seek approval or to avoid censure. The urge to acquire material rewards is an effective motive with young children, especially with children from deprived homes.

In the broader sense, motivation includes the child's overt interest in sports or hobbies, and the intrinsic interest he may have in some school subjects. Whether or not it leads to ultimate learning, these motives lead to practice or activity which has a chance to produce learning. This necessary activity can take place while reading or listening in attentive fashion, and this intrinsic activity can be enhanced by questions inserted here and there. Beyond this close listening or reading, children can be encouraged to frame their own questions, and, of course, they will spend much time in overtly answering questions asked by the teacher. Practice schedules are often arranged in systematic steps. There is an argument about the amount of practice required after one acceptable performance. Perhaps very little more is needed for immediate retention but more may be necessary for sustained retention.

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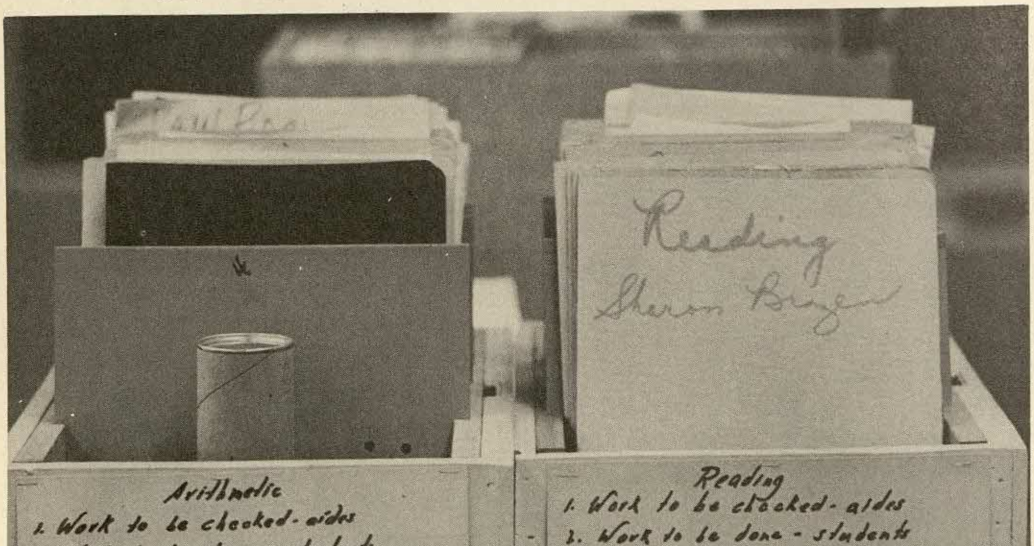

Reading
Sharon Brzen
Arithmetic
1. Work to be checked - aides
2. Work to be done - students
3. Needs work pages
4 Prescription to be written
5 Test needed
Mrs. Ignatius
Reading
1. Work to be checked - aides
2. Work to be done - students
3. Needs work pages.
4 Prescriptions to be written
5. Test needed
Mrs. Ignatius

6

Maintaining a Schedule of Success

In considering the matter of success and the means of encouraging it, this chapter inevitably emphasizes outward behavior. It relies heavily on evidence gathered by the stimulus-response group of psychologists, and has an altogether behavioristic flavor. This seemingly partisan stand, however, is partially offset by the subject matter of Chapter 7, with its emphasis on psychological structure, meaning, and insight. Such topics are dominated by the contributions of the cognitive group.

The Requirements for Modifying Behavior

Suppose that we have undertaken to help Jimmie learn the following things: to say or think "house" whenever he sees the letters h-o-u-s-e; to spend some of his time in reading for pleasure; and to be reasonably cheerful around the home. To help him learn these things, we typically try to accomplish the following steps: (1) Whenever the *conditions* are appropriate (2) we try to get him to perform the *act* we have in mind. We also (3) try to be sure that the act is followed by some success, or reward, or reinforcement. The effect of this combination may be to produce a realization of which act leads to this success (cognition), or to produce a simple protected pairing of the appropriate condition and the act or response, or the strengthening of a connection between the condition (stimulus) and the response, or merely the reinforcement of the response (Skinner).

The Conditions Appropriate for the Behavior

At times we do not need to worry a great deal about the conditions appropriate for the act we have in mind. Under just what conditions, for instance, do we want Jimmie to be cheerful around the house, or to read for pleasure? It is hard to say. Here, this matter of conditions is not especially critical. Within a wide range of conditions we would like to get him to do these things fairly often.

At other times the appropriate conditions are very specific indeed and are easily identified. It is when he sees h-o-u-s-e that we want Jimmie to say "house." It is when the student is asked the boiling point of water that we want him to say "212° F." In many kinds of school work we can be fairly specific about conditions or situations that call for equally specific responses.

S-R Connections versus Discriminated Operants When the appropriate conditions are very specific, we can see how the familiar S-R model of behavior will apply. In this view, the condition would be regarded as a stimulus that actually comes to elicit the response. According to Skinner and his followers, however, only a small portion of the learning directed by the teacher would be considered to come under this *respondent* S-R category.

Within the Skinnerian system most of the behavior with which we have to deal would be regarded as *operant*. In such behavior, according to Skinner, the response is not directly elicited by any stimulus. It is the response itself which becomes more likely (or less likely) to occur. When Jimmie selects a book and sits down to read, for instance, we do not need to imagine some stimulus that brought this about. Most such operants, however, become *discriminated operants*. They are more likely to occur under some conditions than others. Jimmie is less likely to start his reading when playmates are present or when the family is at dinner. He is more likely to do so when the house is quiet. But the quietness of the house is not regarded as the stimulus that causes the response of reading. It is a *cue* that permits the operant response to function at its current rate.

The psychologists who stress operant behavior would point out that there are times when the cues that control discrimination are very general and play relatively little part. We do not go to much trouble, for instance, to decide just when it is that we want Jimmie to be cheerful around the home. There are other times when the cues for discrimination are very important. There are relatively few circumstances in which it is appropriate to say "house." One of these circumstances is the presence of the letters h-o-u-s-e. At times, that is to say, there is a very close relation between the stimulus (h-o-u-s-e), which permits or releases the operant response (saying "house"), and the occurrence of that response. With effective learning, the response follows whenever the cue is present. At this point operant behavior does not differ greatly from earlier views of S-R or respondent behavior in which the cue or stimulus actually initiates the response.

Arranging for Reinforcement

Having decided that the conditions are appropriate, our next step should be to try to get the child to perform an acceptable act. The third step is to make sure that this act encounters some success, or that it is reinforced. In our discussion, as it happens, it will be simpler to give first consideration to the matter of reinforcement, and then to consider the problem of getting the child to perform an acceptable act, or an act that we would be willing to reinforce.

Reinforcement and the Teacher

As pointed out in earlier discussions (Chapter 4), reinforcement has been difficult to define. In earlier theories it had been linked with reward, satisfaction, or need reduction. In Skinner's view, reinforcement is just a convenient label for anything that strengthens the response that it follows.

To employ the Skinnerian notions in rigorous fashion, the teacher would have to decide about each reinforcement by a process of trial and error. Starting with a guess or a hunch, the teacher would see whether or not giving Jane a hug (*possible* reinforcement) actually did make her more likely to put her paints away at the end of the lesson. If so, the hug would be considered a reinforcement for Jane, right now, for this task. There is still the question whether it will work for Sam, or whether it will work for Jane herself later on, or for Jane herself when working on any other task. Even in deciding whether the hug is really the thing that works for Jane on this task, the teacher faces some serious pitfalls in logical inference (see Chapter 8), and these would be difficult to deal with outside the laboratory.

General Reinforcing Conditions

Obviously it will be difficult to decide in rigorous fashion just which events will act as reinforcements and which will not. Probably for some time, if not forever, teachers will have to decide about reinforcements on the basis of more general information and common sense. Even if a teacher is committed to the more rigorous procedures, he will have to use general information and common sense in deciding which reinforcement to try out in the first place. When such a reinforcement does survive the elaborate test, moreover, the teacher will almost inevitably use general information and common sense in deciding whether this tested reinforcement will also work in other circumstances. Many teachers will be forced (and others may choose) to rely on such general information throughout. Below we give an account of a number of things which have been regarded as possible reinforcers in one situation or another.

✓ *Physiological Feedback* Some of the most pervasive reinforcers are almost completely beyond the teacher's control. They are reinforcers that we can exploit, or that we must contend with, but that are almost impossible to alter in the classroom situation. The child who bites into the stolen apple will experience the pleasant taste, no matter whether we wish him to or not. After securing a "fix," the drug addict will experience physiological release that will be hard to circumvent. Even more inevitable and automatic are the *proprioceptive* stimuli or movement-produced stimuli discussed in earlier chapters. To make a movement and to feel the normal feedback from the muscles and tendons and joints is moderately pleasant. For infants, it may be marvelous fun. To initiate a movement and to fail to receive the normal feedback is quite frustrating.

Adams (1968) suggests a picture of fantastic proprioceptive reinforcement, or guidance, accompanying each of the thousands of movements we make each minute of the day. When any finger twitch has achieved success, as in reducing an itch or in striking a typewriter key, it leaves a proprioceptive record of itself in that vast memory drum of our nervous system. When, later on, the "program" calls for a similar action, an elaborate subprogram is launched. Under this subprogram a host of split-second, tentative mini-movements are tried out until one accomplishes the unconscious "feel" that accompanied some earlier success.

✓ *Automatic External Reinforcement* Along with the reinforcement arising from the body itself, there are other forms of reinforcement that are automatic or almost inevitable. Such automatic or inevitable reinforcement is often found in the schoolroom. A student, in learning to type, usually knows when he strikes a second key before the first has returned. A student of music, who has any ear at all, can tell when he has played the wrong note. Similarly, in an endless number of activities the correct and incorrect reactions will bring about striking differences in reinforcement.

This automatic reinforcement from outside the body, like the primitive proprioceptive reinforcement, plays an important part in performance and in the acquisition of skill. To see how dependent we are on the automatic feedback, it is only necessary to interfere with the normal flow of stimuli that ordinarily follow our behavior (Smith, K. U., 1962). Any such disruption is most disturbing and markedly reduces our skill. By ingenious electronic devices, for instance, we can arrange things so that the student hears his own voice only after a brief interval. As a result he stammers, grows tense, and shows much disturbed behavior (Yates, 1963). In other experiments a student is required to write out words while his hand is hidden behind a barrier. He sees his hand move through a television screen. When a delay is introduced between a movement and the sight of the movement, there is a marked reduction in performance (Smith, W. W., and others, 1960).

It is not only in acts of bodily skill that effects may be automatic and striking. In solving a mathematical problem, for instance, it is often obvious that we are on the wrong track. In translating from a foreign language, a mistake may reveal itself by the failure of the subsequent context to make sense. We can tell that we must have made a mistake somewhere. This is also true in ordinary reading. An erroneous interpretation of a word or phrase will produce the effect of confusion or nonsense or the feeling that something is amiss.

Much automatic reinforcement may come merely from coming to see things more clearly. Woodworth has called this process the reinforcement from perception. We see a fuzzy scene. We gaze at it more intently, automatically changing the focus of our eyes. We are rewarded by a clearer picture. This experience may constitute pronounced reinforcement. More recently Gibson (1970) has spoken of the reinforcement that comes whenever a perplexing degree of uncertainty is substantially reduced.

√ *Valued Activity as a Reinforcement* Inevitably one activity is followed by another. The activity of completing the task may be followed by the activity of free running and shouting (Homme and others, 1963). As pointed out in Chapter 5, this possible running and shouting may serve as a motive for an act (completing the assignment) that has not yet been performed. By the same token it may serve as a reinforcement for that act when it has been performed (Premack, 1965). In line with the same Premack principle an activity, such as visiting the zoo, may serve as a reinforcement for some other activity, such as getting dressed.

The Premack principle has figured most prominently in the writings of behaviorists and of those concerned with behavioral analysis. Such psychologists, of course, would vigorously reject the label "valued activity" as a description of the activity that serves as reinforcement. Avoiding such a subjective term, they speak of *high-probability behavior*. Whenever you can arrange things so that a low-probability act (carefully closing the door upon exit) is followed by a higher-probability behavior (running and tussling with friends), the high-probability behavior should act as a reinforcement for the less frequent act.

√ *General Reinforcement* Very often the teacher will apply the appropriate reinforcement with no effort whatever. If the pupil makes an incorrect response, the teacher's eyebrows may rise, or an expression of surpise or annoyance may cross his face. If the pupil is right, the teacher's facial expression often shows pleasure or relief.

The teacher, of course, is not the only one who reacts unconsciously or spontaneously to the responses that occur in the classroom. The other students inevitably indicate their attitude by a variety of expressions. These may include the guffaws or snickers which greet a real boner, or the violent shaking of hands offering to supply the right answer, or a quiet acceptance of a proper response.

Along with these clear-cut, though often unintentional reactions to the pupil's behavior, there is a built-in system of reinforcement which is at work whenever the teacher gives an extended explanation. As we point out in Chapter 5, a pupil in listening to an explanation is seldom completely passive. He reacts to what the teacher is saying, often running ahead of what is said and guessing what is coming next. The succeeding statements of the teacher let him know whether or not his guesses are on the right track. If he is on the right track, he experiences considerable reinforcement.

√ *Deliberate Contingent Reinforcement* We can be very grateful for the useful reinforcement that is bound to occur whether we do anything about it or not. But we should not rely exclusively on this free reinforcement. An essential part of teaching is to provide an efficient schedule of reinforcement, and one that goes far beyond the haphazard reinforcement that occurs apart from our efforts.

Traditionally, the teacher has provided deliberate reinforcement by overtly accepting or rejecting the statements made by the students. He exclaims "Good" or "Right" when the student's statement is correct. He refrains from making such a comment if the statement is not up to the standard that he has in mind at the moment. When used in this deliberate fashion, such reinforcements are *contingent* upon the execution of a prescribed response. As learning progresses, of course, the teacher typically changes his idea of what he will accept in the way of response (see behavior shaping, discussed later in this chapter). At any given moment, however, the teacher will limit his reinforcement to a specified kind of response.

Especially with older students, many of the contingent deliberate reinforcements will consist of comments like "Good" or "Right" or a vigorous nod of the head. Other kinds of deliberate reinforcements are used, however, especially in individual instruction of younger children. Listing reinforcements used in one circumstance or another, Bijou and Sturges (1959) mention food (candy pellets), toys, pictures or music, adult attention (especially approving attention, such as a smile), and tokens.

√ *The Extent of Deliberate Control* With so many sources of reinforcement—some of them built-in, others automatic or almost inevitable—we must face the fact that the total pattern of reinforcement is only moderately susceptible to our control. Under the best of circumstances the reinforcement deliberately applied will be only one small part of all the reinforcement in effect. In the typical classroom, moreover, the problem is greatly complicated. At each moment every student is emitting a flood of responses, some relevant to the task at hand, many not. The little bit of reinforcement that the teacher can supply can be expected to influence only a small fraction of this total output, and this limited deliberate reinforcement must fit into a veritable melee of more automatic reinforcement from other sources.

When using deliberate reinforcement, the teacher can decide just how brief or how elaborate these reinforcements will be. Sometimes a brief "Correct" may have to do, and may well do. Some teachers find themselves automatically—almost compulsively—repeating the student's correct answer. When overdone, this can become a tiresome mannerism. Kept within bounds, however, it may help, especially when used to reassure a hesitant student or to emphasize the crucial part of the correct answer. In one computerized program this procedure of repeating the correct response, coupled with a corresponding procedure of showing the correct form for the wrong answers, proved to be the most effective method of reinforcing (Gilman, 1969).

Many of the contingent, deliberate reinforcers may be incorporated into gadgets and toys or other devices (Schwitzgebel, 1968). The Montessori system and More's responsive environment make much use of these mechanical arrangements. The complex machinery becomes most spectacular in computerized teaching, discussed later. With more simple physical arrangements, paper is sometimes treated so that the child will see a mark going down so long as his pencil follows the right path. No mark will occur, however, if he moves beyond the assigned limits (Gibson, 1970; Stephens, 1931). Answer papers are arranged so that the student gets one result (invisible ink springing to life; a stylus breaking through the paper) if he chooses the correct answer, but nothing happens if he is wrong. These work automatically and should not seem to arise from the whims or caprice of a human teacher.

Immediate versus Delayed Reinforcements

Typically the reinforcements provided by machines or other gadgets come almost immediately after the act. Those provided by the teacher, on the other hand, could easily be delayed. The delay could be a matter of seconds while the teacher is deciding what to say or a matter of hours or days while test papers are being marked.

Experiments with animals and some early studies of human learning suggested that reinforcement should come right on the heels of the act to be reinforced. (See Terrell, 1965, for a review.) These results fitted in with the commonsense notion that if you delay the reinforcement some other act might occur meanwhile, and this unknown, perhaps incongruous, response would be the one to be reinforced. This work, however, was largely based on such physical tasks as hitting at a target (Stephens, 1931) or dropping marbles in the correct hole (Marshall, 1969). Even for such simple tasks, moreover, there has been some evidence that a delay in reinforcement may actually help people to retain whatever they do learn (Brackbill and Kappy, 1962).

Delayed Information about the Correctness of Answers

A total of 663 grade eight students read a three-page article about glaciers and another about the social problems of Rhodesia. Immediately after reading each article they were tested on that article. Some of the students were then told immediately whether or not each answer was correct (and given the correct answer). Others did not receive this feedback information until 2½ hours later, and still others had to wait 1 day or 4 days. For each condition, half the students were again tested immediately after the feedback information and half were tested 3 days after receiving the feedback.

Average Scores (Corrected for Differences in IQ and Reading Ability)

Delay between First Test and Feedback	*Tests Given Immediately after Feedback*		*Tests Given Three Days after Feedback*	
	Glaciers	*Rhodesia*	*Glaciers*	*Rhodesia*
No delay	15.1	13.9	13.0	12.5
2½ hours	16.7	16.3	15.4	15.0
1 day	16.9	16.0	16.0	15.8
4 days	16.7	16.4	14.6	13.3

The general pattern of differences from top to bottom was significant.

SOURCE: Arthur J. More, Delay of feedback and the acquisition and retention of verbal materials in the classroom, *Journal of Educational Psychology*, 1969, 60(5), 339–342.

In contrast to the laboratorylike investigations, the experiments using classroom materials regularly report that delaying the reinforcement—ranging from a few seconds to several days—does not reduce the effect on immediate learning, and clearly improves retention over a period of several days (More, 1969; Sassenrath and Yonge, 1969; Sturges, 1969). When brief periods of delay (5 to 20 seconds) are employed, the student answers the multiple-choice question, and the reinforcement consists of showing him the correct answer before he goes on to the next question. For long periods of delay (24 hours or more) there must be some means of re-presenting the question so that the student can see which question goes with which correct answer. This additional presentation may revive the material to a certain extent.

It has been suggested that there may be social class differences in the effects of delay (see Walls and Smith, 1970). Middle-class children come from a culture in which *deferred gratification* is the rule, and in which it is customary to wait for important reinforcements or rewards. This may be more disturbing to lower-class children, however, or to any group that focuses on immediate rewards. The evidence about the differential influence of delay is not clear-cut (Marshall, 1969).

Providing Adequate Reinforcement

At the outset of any learning, when we are trying to develop a response that has little chance of occurring, we should be generous in the amount of reinforcement supplied. Insofar as we can control things, it would be best, at this stage, if we could reinforce the response every time it does occur (Lewis, 1960; Salzinger, 1959). This, of course, is an ideal. Under classroom conditions we cannot hope to meet this exacting schedule.

Partial Reinforcement In guaranteeing an adequate amount of reinforcement for the less capable student, we face the all too frequent irony of "to him who hath shall be given. . . ." The student who is already fairly competent needs only a little additional reinforcement to bring him up to the necessary standard. Yet this very competence is bound to bring him a great deal of reinforcement. He will make many correct responses and will encounter the results that they bring. His less competent colleague, on the other hand, needs many more reinforcements, but, under natural conditions, he will not make the responses that will produce the reinforcement he needs. Part of the teacher's job is to break into this vicious circle and engineer things so that the student in need of help will attain more reinforcement than his own natural efforts will provide. This problem is treated in a later section.

As the response acquires additional strength, and as it occurs more frequently, we can afford to change to a schedule of *partial-reinforcement*. Not only is this permissable as far as immediate learning is concerned but it is actually beneficial from the point of view of retention. Considering the matter from a cognitive point of view, we could easily understand how students learning under 100 percent reinforcement may be easily discouraged when they later encounter a series of trials that give no reinforcement whatever. Under this condition the learned response may be quickly extinguished. Suppose, up to now, your car had *always* started (100 percent reinforcement) when you turned the key. After that experience, a series of failures might quickly lead you to give up completely. If, however, you had *always* been used to partial reinforcement (sometimes yes, sometimes no) you may keep on trying in spite of a long series of failures. The schedule of partial reinforcement helps prevent extinction or discouragement when reinforcement is withdrawn. Retention of what is learned may thus be favored by a program of partial rather than 100 percent reinforcement.

Not everyone, of course, would accept the cognitive explanation that is implied in our illustration. Adaptation-level theorists (Chapter 4) would point out that with 100 percent reinforcement the adaptation level becomes rather high. Any given individual reinforcement would have to be impressive to stand out or register against this background. With partial reinforcement the adaptation level is much lower and each reinforcement stands out more clearly from this more modest norm and thus carries more weight. Psychologists influenced by the Freudian or Hullian approaches have suggested that the failure to experience a customary reinforcement causes frustration and arousal (Amsel, 1962) leading to more vigorous learning, or that it turns the just-missed, elusive reinforcement into a more compelling goal (Lawrence and Festinger, 1962). Although the followers of Skinner have done most of the work on partial reinforcement, they are not especially concerned about the question of "Why?" They are chiefly interested in developing general laws showing the changes in response probability that will follow from specified changes in the schedule of reinforcements.

When reinforcements are administered by laboratory apparatus, the total amount of reinforcement can be diluted according to very precise schedules. We could arrange things so that the reinforcing machinery would be turned off for five minutes (or five days), then on for ten minutes, and so forth. Only the response occurring during the "on" period would be reinforced. This is a *fixed-interval* schedule. Or we could vary the intervals in random fashion, the length of the "on" period or of the "off" period being unpredictable (variable interval). Adopting another tactic, we could decide to reinforce only every third (or *n*th) response (fixed ratio) or we could vary the ratio randomly, providing one reinforcement after (say) three responses, the next after (say) eight responses, the next after five, and so on (variable ratio). This last schedule produces responses that are likely to be retained over a long period of no reinforcement.

Within the classroom it may be difficult to establish a precise schedule of partial reinforcement. Thinking of the practical circumstances that govern these things, we would expect that the reinforcement actually employed will contain aspects of all four schedules, with the variable schedules predominating. Fortunately, the schedules forced upon us will probably turn out to be reasonably efficient.

In general the use of precise schedules of reinforcement is a painstaking process. In many school experiments this procedure has called for one person to reinforce each student (Brown, Montgomery, and Barclay, 1969)—a procedure that can be justified chiefly in doing important remedial work. Recently, however, there have been some attempts to apply more general schedules of reinforcement in the class as a whole (Glaser, Reynolds, and Fullick, 1966), especially in matters involving discipline and order (McAllister and others, 1969).

Arranging for Acceptable Responses

We can reinforce a response only after it has occurred. It is only when Jimmie has acted cheerfully that we can reinforce this behavior. It is only when he has reacted to the letters h-o-u-s-e by saying "house" that we can reinforce this response. After some competence has developed, these responses pour forth in great profusion and at that point we can decide whether to apply reinforcement for each and every success or for only a small fraction. At the outset of learning, however, the situation is very different, and at this point we may be hard put to get a single response that we would feel free to reinforce. We face the problem of getting Jimmie to say "house" at least once or of getting him to act in a cheerful manner on at least one occasion.

To get a response that we feel we could reinforce, we can adopt either one of two general strategies. The first strategy merely asks us to change our standards when deciding whether or not a response should be reinforced. At the outset we could reinforce anything that remotely resembles the desired response. Later, of course, we provide reinforcement only for actions that come closer and closer to the desired response. This is called *behavior shaping.* The other strategy calls for *guidance.* In this procedure we introduce some supplementary stimulus to bring about the full desired response. As the student hesitates, we point to the right answer. We give him a vigorous hint. We show him a picture of a house in the hope that it will lead him to utter the word "house."

It is seldom, of course, that a teacher depends entirely on one or the other of these strategies. Most teachers will make liberal use of hints, cues, models, and guidance. If the first response produced by this guidance is close to the desired response, the teacher will typically supply reinforcement. Later, he will insist on a closer approximation.

Behavior Shaping

The process of behavior shaping has been stressed in the work of B. F. Skinner (1953). (See also Staats and Staats, 1963.) It is a process that you adopt without thinking when a child first begins to pronounce words, or when a first-grader turns in his first crude art work. In either case the production will fall far short of perfection. Using an absolute standard, you could find little to commend. But you do commend, often with enthusiasm, and thereby provide the necessary reinforcement.

Behavior shaping has often been employed in training of animals. Suppose you want to teach a young chimpanzee or other ape to do interesting finger painting. You select some reinforcement that is effective for chimpanzees. Perhaps approving attention will do, or perhaps a grape or a raisin. At first you will applaud or supply a raisin as soon as the ape even looks toward the paint pot. You can depend upon it that the paint pot will soon become a frequent object of regard. Now you raise your standards. You give the reinforcement only when the ape makes some motion toward the paint—leaning, reaching out, or taking a step in the right direction. At each stage of progress you become more and more exacting. In successive stages you commend or reward only when the paint is actually approached, touched, applied to *some* surface, applied to an appropriate surface, applied in some reasonable manner, or applied in the manner of Van Gogh rather than in the manner of Cézanne—if you think the latter stage of development feasible and desirable.

There are times, of course, when you may be reluctant to use the technique of shaping behavior. It is easy to be somewhat flexible in your judgments of artwork, compositions, or social elegance. But what can you do when the pupil takes liberties with such factual material as the sum of 8 and 9, or the date of Columbus's first voyage? You may not find it feasible or morally justifiable to accept or reinforce such incorrect answers. If you wished, you could, of course, commend the general approach. You could say "That's close, but . . ." or "You're on the right track." But flatfooted commendation might seem out of the question.

This behavior shaping plays an especially important part in establishing a discriminated operant response. When the infant first emits the response of "da da," for instance, we reinforce it enthusiastically, and soon it acquires a high probability of occurrence. At this stage, however, it is not a discriminated operant. It is emitted not only in the presence of the infant's father but in the presence of his mother, his sister, or the TV repairman. To develop a discriminated operant, we begin by reinforcing the response irrespective of the conditions. As the frequency of responding increases, however, we make the reinforcement contingent on more and more restricted conditions. We may now reinforce only when the response is uttered in the presence of a human being, next we may insist that it be made in the presence of an adult male, and finally we may reinforce the utterance only when it is applied to the father himself. In the same way we could reinforce Jimmie every time he said "house," no matter what the word in front of him. After a reasonable rate is established, we could refuse to reinforce unless the response occurred in the presence of a word beginning with an "h" sound, then only for a word that also had five letters. Gradually we would become more and more exacting until reinforcement would follow the response only when made in the presence of the specific letters h-o-u-s-e.

Guidance and Supplementary Stimulation

Theoretically, behavior shaping could be used to get a child to say "house" in response to the letters h-o-u-s-e, but not to h-o-r-s-e; or to say "7" to 4 + 3, but not to 4 — 3. But the process seems almost grotesquely unwieldy, and most teachers would prefer a more direct approach. To accomplish this approach we often use some supplementary arrangement to guide or maneuver the student into the desired response. To give this guidance to a pupil who sees the letters h-o-u-s-e, we need merely *find, and use, some situation or experience that is already capable of making him say "house."* We might use a picture of a house. We might ask him what Mr. Brown is building down the street, or we might merely ask him to repeat the word "house." When, *by one means or another*, we succeed in getting the correct answer, we promptly reinforce this correct response by commendation or in some other way. In the same manner we can use this simple type of guidance to get a child to spend time in reading, or get him to be cheerful.

Again, a simple request might get him to sit down with a book. A lively, jolly approach might lead him to smile. When these desired acts occur be sure to reinforce them.

The Role of Supplementary Stimuli There is disagreement between the followers of Skinner, on the one hand, and the classical S-R psychologists, on the other, on the function that these supplementary stimuli perform. The classical S-R psychologists invoke the model of the conditioned response. The letters h-o-u-s-e are regarded as the bell, or neutral stimulus, in Pavlov's experiments. The picture of the house is regarded as the unconditioned stimulus already capable of making the child say "house." When these are paired, the neutral stimulus h-o-u-s-e also comes to elicit the response of saying "house," just as the bell also comes to make the dog salivate. Here the key process is to pair the new neutral stimulus with a stimulus that is already adequate, and then to be sure to reinforce the response ("house") when it does occur.

Behavior Shaping and Stimulus Fading in Remedial Reading

Second-grade children (12 in all) who were expected to fail in reading were given special training in reading. Behavior shaping was used by first giving the child a candy or nut whenever he got one word right. Later he received the reinforcement only if he got a whole line right, and still later he was required to read two lines. Stimulus fading was used by first showing the child a picture with the label printed in large letters. On successive occasions, the label was made smaller in size, the picture was made less conspicuous, and was placed so that the child had to go to some trouble to peek at it. He was permitted to do this if he felt the need.

	Average Number of Errors		
Measurement taken:	*Group A*	*Group B*	*Group C*
Before any treatment	76.5	76.0	80.0
After introducing reinforcement alone (R)		62.3	
After introducing fading alone (F)			16.6
After introducing both F and R	10.4	7.1	8.2
After withdrawing both F and R		100.6	

SOURCE: Norma Hauserman and Roger McIntire, Training elementary reading skills through reinforcement and fading techniques, *Proceedings of the 77th Annual Convention of the American Psychological Association*, 1969, 4 (Part 2), 669–670.

Stimulus Fading The followers of Skinner refuse to regard the letters h-o-u-s-e as the stimulus that ultimately comes to elicit the right response, and they shy away from any procedure that would seem to lean on this notion. They think of both the picture of the house and the letters as part of the general situation in which the operant response (saying "house") occurs. This response is reinforced until it occurs frequently and then a new program is begun to be sure that the pupil will say "house" even when no picture is present. This process resembles that used in developing a discriminated operant response, and is called *stimulus fading.* Gradually the picture of the house becomes less conspicuous, becoming more schematic or merely less visible. If the fading is too rapid and the rate of responding drops, the picture is made more conspicuous until this situation is corrected. The process is continued until the child is successfully weaned from the extraneous cues (Hauserman and McIntire, 1969).

In actual practice there is considerable overlap between the conditioned response technique and the technique of stimulus fading. Both call for the presence of some extraneous stimulus or supplementary cue. Both are intended to induce a reinforceable response. With both techniques the supplementary or extraneous features are eliminated in a manner that will not seriously reduce the rate of responding.

Widespread Use of Techniques Apart from the technical jargon, or outright linguistic atrocities, the general principles for inducing the desired response are quite ancient, and have been used by teachers and others as long as people have been instructed (Stephens, 1967). Whenever the desired response is not forthcoming, we automatically, compulsively, resort to hints, suggestions, or outright prompting. When the child gives no response to the letters d-o-g, we say, "What is the sound of the last two letters?" "What has four legs and barks?" or in less subtle fashion we may merely supply the elusive word. In mentioning this technique of supplying the correct answer, by the way, we must not speak in a sneering or disparaging fashion. At times, this simple, unsubtle procedure of merely telling the student the correct answer may prove to be as effective as any other form of guidance.

Just as teachers over the centuries have almost automatically employed reasonably effective devices for eliciting an acceptable response, so have they also attempted to wean the student away from dependence on supplementary devices. They present the devices in abbreviated or simplified form, or they withhold them for a brief time, finally withholding them altogether when it seems safe to do so.

Manual Guidance or Tuition The teacher is by no means restricted to the arbitrary form of guidance provided by the simple conditioned reflex formula. There are many additional procedures which are much more elaborate and which are less rigid. They point the way to the correct behavior, or they lead the student toward a better way of doing things. By means of these devices we take some steps to prevent the student from merely floundering along on his own.

When a student is learning to write or to draw or to use an instrument of any kind, the teacher may provide ordinary physical guidance. The teacher may place the pencil in the student's hand so that he holds it properly. Or he may move the student's hand so as to form the letter correctly. He may help guide the saw. In teaching physical education, he may move the student's body to a position that gives a more adequate posture. When students in a laboratory are learning a pencil maze, the experimenter may take the learner's hand and guide it around the correct path. These are merely illustrations of what is meant by manual guidance. These procedures do not always bring about good results. Sometimes this mechanical guidance is extremely irksome to the learner. There are other times, as we shall see, when guidance of any sort is of little use.

Rereading of Material To Be Memorized When material has finally been memorized a whole host of tendencies or habit units have been formed. When, for instance, we hear "Mary had a little lamb," we are led to think "Its fleece was white as snow." One idea suggests the other. The question is, how to use guidance in forming these associations or tendencies. It happens that the simple process of rereading the material provides perfect guidance (Forlano, 1936). If, after reading the first line, we immediately proceed to read the second line, we are getting a maximum of guidance. We are being led to make the correct response to the first line. On the other hand, if we covered up the second line, we would be deprived of that guidance. Theoretically, our next response could be anything in the way of a guess. With the line uncovered there is no guess, but almost perfect guidance.

Learning Vocabulary by Looking Rather Than Guessing In learning a vocabulary list, a student will get the maximum amount of guidance if, after looking at the foreign word, he looks immediately at the English word. In this way he will be prevented from making the wrong response. He will be guided into the correct association for that particular foreign word (Forlano and Hoffman, 1937).

Use of Rhetorical Questions Teachers very frequently answer their own question. This practice, of course, can be overdone and may even reach the stage of becoming an annoying mannerism. Nevertheless, it is a form of guidance. The teacher asks the question. Before the student has a chance to give a wrong answer, the teacher provides the right answer, thus guiding the student inescapably toward the correct behavior. An instructor of aerial navigation, for instance, may ask, "What is that town off toward four o'clock?" Then, when the students are still frantically trying to identify the town from their maps, he may add, "It is obvious that this town must be Centerville. See how the railway comes in from the northwest, crossing a loop of the river on the two bridges."

Recitation in Unison The ancient practice of having the whole class recite in unison—now upgraded to "choral reading"—provides a type of guidance. When any member of the class begins to falter he is bound to be guided back to the right path by the statements of the rest of the class. Each student is thus guided or forced to respond in conformity with the majority. Of course, if the majority should be wrong, this would provide guidance in the wrong direction.

Hinting or Prompting As we have seen, hints can be used to get the child to think of a word he cannot recognize. Hints and prompting are also used at a more advanced level. If a student cannot give the formula for heavy water we may ask him the formula for ordinary water, hoping, by the use of this supplementary question, to give him some hint. At times, instead of asking a supplementary question, we merely suggest, "Remember, this man lived in the seventeenth century," or, "Don't forget that it is the altitude of the parallelogram that determines its area."

Preventing Competing or Erroneous Responses One way to get a child to respond in the way we have in mind is to make it difficult for him to do anything else. If there is very little else that he can do on this rainy afternoon, Jimmie may read. You might get him to say "house" or "36" by warning him away from any other answers you think he is likely to make. When first asking about the capital of Maryland, for instance, you could remind him that it is not Baltimore.

We often face this problem of preventing competing responses when we are constructing examination questions of the completion type. We want our students to think of Marlowe as one of the outstanding dramatists of the Elizabethan period. If our question merely reads: "One of the outstanding dramatists of the Elizabethan period was ________?" We are likely to get Shakespeare or Ben Jonson. To take care of the problem we may write, "Along with Shakespeare and Ben Jonson, one of the outstanding dramatists of the Elizabethan period was ________?" This proceduce is called *preempting* the responses we wish them to avoid.

The Overlapping of Guidance and Reinforcement

It is difficult to apply reinforcement without also providing some guidance. True enough, it can be done, but one must go to some trouble to arrange it. By the same token, it is difficult to provide guidance without at the same time providing reinforcement. Let us think of the dog learning to salivate when he hears the sound of a bell. At the outset the meat powder acts as guidance. It forces the dog to salivate which is, of course, what we want him to do when he hears the bell. But, later on, this same meat powder will act as reinforcement. With practice the dog will come to salivate as soon as he hears the bell, and the meat powder will not appear until the act of salivation has begun. Under these conditions, the meat powder functions as a type of reinforcement. If the dog has already salivated and the meat powder is then put into his mouth, we have a good result, and the tendency to salivate will be strengthened. If, on the other hand, the salivation occurs but no meat powder follows, we would have a bad or useless condition, and the tendency to salivate would be weakened.

Even in the basic formula for the conditioned response, then, the meat powder can act either as guidance or as reinforcement. It can either point the way to a new kind of response or it can confirm a response that has just been made. Which of these roles the meat powder assumes depends on the timing. If it is presented *before* the dog makes any response, it will act as guidance. If it is presented *after* the dog has made a definite response, it will act as reinforcement.

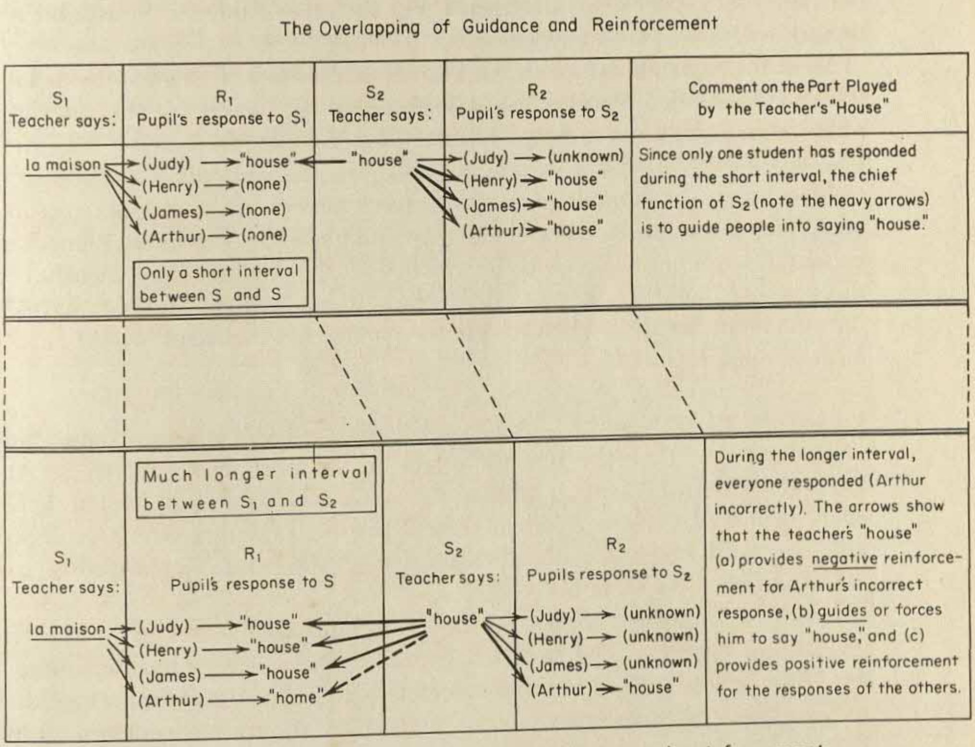

The Overlapping of Guidance and Reinforcement
S₁ Teacher says:
R₁ Pupil's response to S₁
S₂ Teacher says:
R₂ Pupil's response to S₂
Comment on the Part Played by the Teacher's "House"
la maison
(Judy) → "house"
(Henry) → (none)
(James) → (none)
(Arthur) → (none)
Only a short interval between S and S
"house"
(Judy) → (unknown)
(Henry) → "house"
(James) → "house"
(Arthur) → "house"
Since only one student has responded during the short interval, the chief function of S₂ (note the heavy arrows) is to guide people into saying "house."
Much longer interval between S₁ and S₂
S₁ Teacher says:
R₁ Pupil's response to S
S₂ Teacher says:
R₂ Pupils response to S₂
la maison
(Judy) → "house"
(Henry) → "house"
(James) → "house"
(Arthur) → "home"
"house"
(Judy) → (unknown)
(Henry) → (unknown)
(James) → (unknown)
(Arthur) → "house"
During the longer interval, everyone responded (Arthur incorrectly). The arrows show that the teacher's "house" (a) provides negative reinforcement for Arthur's incorrect response, (b) guides or forces him to say "house," and (c) provides positive reinforcement for the responses of the others.

Figure 6.1. Chart showing the overlapping of guidance and reinforcement.

Just as the meat powder may act either as a guide or as reinforcement, so may the teacher's comment act in either way. When the students are learning a list of French words, for instance, the teacher can supply the correct translation immediately or he can wait for a short interval. Suppose that the teacher says "*la maison*," and immediately thereafter says "house." During that brief interval few, if any, students will have had a chance to make any response at all. Consequently, the English translation "house" can only serve to tell them what the answer is or, more technically, to guide them into the correct response. Again the teacher says "*la maison*." This time, however, he hesitates an appreciable time before he says "house." During this longer interval many, perhaps most, students will have made some silent response. For these students the teacher's announcement of "house," coming on the heels of some response, will act as reinforcement of some kind. If, during that interval, a student has silently responded "house," the teacher's announcement of "house" will act as confirmation or positive reinforcement. It is possible, of course, that some student may have responded in some other way during the period of the teacher's silence. In that case, the teacher's announcement of "house" will point out the error and will also *guide* him into the correct answer. But this feature of guidance will be present only for those students who have failed to make the correct response during the interval between the teacher's two statements. For the other students the teacher's second remark will serve as reinforcement.

As in the vocabulary lesson, so also in many other activities, the teacher can switch from guided learning to reinforced learning merely by altering the timing of his comments. After posing a question, for instance, the teacher may rush in to give the answer, or he may hesitate and give the students a chance to answer silently before he himself gives the correct answer. In a straight lecture, after beginning a statement, the teacher may complete the statement immediately, or he may hesitate a few seconds, in which time the students may silently complete the sentence, and then go on to finish the statement. If the students have finished the statement for themselves, the latter part of his comment would constitute a form of reinforcement.

Values and Limitations of Guidance Clearly guidance is a most important technique and one that the teacher ought to strive to use effectively. At times guidance is almost essential. At other times it is a valuable supplement. It is, moreover, a rational, humane, and intelligent device. Learning which is deprived of guidance, and which is reduced to sheer trial and error, appears to be a stupid, cruel, and perverse form of learning.

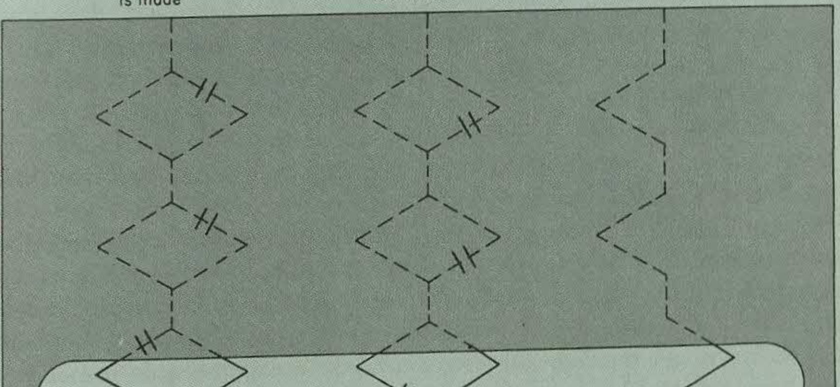
In considering these things, however, we must not be misled by the claims of gentility or niceness. The fact that guidance seems less brutal and more intelligent should not blind us to the harsh fact that guidance has limitations. It is very seldom that the student can reach perfection, or even acceptable proficiency, through guidance alone. In almost all learning there comes a stage when the student can improve only by a certain amount of trial and error on his own (Kittell, 1957; McGeoch, 1942). We can guide his hand while he forms the letters, but we can help in this way only up to a point. After a while he must try out different movements on his own and, after a certain amount of blundering, he will come to produce letters that have a more acceptable appearance. Similarly, we can do much to guide the movements of the student swimmer. We can tap him when it is time to breathe. We can place his arms in this position or that. But before he becomes a skilled swimmer he must flounder around a bit, trying this device and that, until he finally hits on a cue for breathing at the right time. For the student learning to speak in public, we can provide much guidance. We can signal him to use more gestures, or to cut down on his gestures, or to tell a joke, or to launch into his final statement. But ultimately he must experiment on

Guidance vs. Trial and Error

Strings of diamond-shaped patterns such as those shown in the table were printed on strips of paper. As the paper moved past a slot, students were required to follow the correct path. The wrong path was shown by two little cross lines. The sixty students had been randomly assigned to three different groups. For the *first four* trials, the different groups received different treatment. For one group the cross lines were toward the end of the wrong path. The student could not see them until after he had made his choice and had begun to follow one path or the other. For the other group the cross lines could be seen before the choice was made. These students were thus guided into the correct path before they had had a chance to make a mistake. During these first four trials, the third group saw *only* the correct choice.

Following the first four trials, all students worked on mazes like that to the left. During those trials they had to make their choice before knowing which choice was correct.

Procedure During First Four Trials



	Right and wrong choices shown after choice is made	Right and wrong choices shown before choice is made	Only right choice shown
Trials needed to learn	24.2	10.4	18.8
Errors after 4th trial	76.3	15.8	52.1

All differences are significant.

SOURCE: J. M. Von Wright, A note on the role of "guidance" in learning, *British Journal of Psychology*, 1957, **48**, 133–137.

his own and try this method and that, getting different kinds of reinforcement from different approaches.

Guidance is a most valuable tool. But, like other valuable tools, there are times when it should be used and times when it should be laid aside. In carrying hints, prompts, or other forms of guidance to an extreme, we can actually reduce the efficiency of learning (Anderson, Faust, and Roderick, 1968; Kanfer and Duerfeldt, 1967).

Programming and Automation

For different theoretical reasons, many psychologists agree that reinforcement, or the awareness of results, is crucial in learning. Many of these psychologists advocate the use of mechanical devices to supplement the teacher's efforts or to provide the all-important reinforcement in more dependable fashion. Some years ago programmed instruction (PI), with or without machines, was regarded as a panacea. Now the great hope lies in computer-assisted instruction (CAI). Along with these soaring hopes, there is some doubt about whether the elaborate machines will greatly improve on the teacher's doing what comes naturally.

Linear Programs

People who advocate linear programming try to make sure that almost every response will be reinforced. Not all psychologists, of course, agree that it is wise, or possible, to make sure that the student is guided into each response with no room for uncertainty or error. Especially in the field of problem solving (Chapter 8) some investigators (Wohlwill, 1962) hold that a period of doubt or uncertainty may be useful. As suggested earlier, moreover, a lavish program of prompting or guidance can actually hinder learning (Anderson, Faust, and Roderick, 1968). But the advocates of linear programs hold to their position and try to make sure that almost every response will be reinforced. They try to do this by arranging for a graded series of tasks in which the student moves ahead only one very small step at a time. The first task is so easy that practically no one could fail to get the right answer or to make a reinforceable response. An introductory task might be one such as the following: "In training a dog to sit up and beg we should make use of some reward or reinforcement. If the dog is hungry, the simplest reinforcement is ______?" It is assumed that no one could fail to write "food." If a fair number of people did write some other word, the item would be revised so that "food" would be even more obvious as an answer. After the student has written in a word ("food," we hope) he finds out right away whether or not he is right. With the text, he gets this information by turning the page. With the machines, this is done mechanically. The correct answer appears as the student advances his own answer under a transparent shield. With the more elaborate computers, this is all included in the program.

Provided that the programmer has anticipated matters correctly, the student will find that his first response has been right. This positive reinforcement should develop or strengthen some new association, such as that which links the idea of "reinforcement" to the idea of "food for a hungry animal." Because of this experience, the learner could now readily attempt a new task such as, "If a hungry animal encounters food after making a response, we could say that the response has been ______?" By virtue of his experience with the first question he should now be able to give "reinforced" as the proper answer.

Branching Programs

As we have said, the linear program is aimed at getting a great many reinforceable responses and avoiding responses that cannot be reinforced. In other programs, such as the branching programs, however, there is less insistence that every response be reinforced. A number of errors are to be expected, and special arrangements are provided to take care of these. You just go from one question to the next. If you do choose a wrong answer, however, you will find that you are given special instructions on what to do from then on. These special instructions send you off on a branch program, or detour. If you are working on a branching program and make no errors, you will find this arrangement to be exactly the same as a linear program. Some branching programs treat errors by merely sending you back to the question you just missed. Some of them send you on a "remedial loop" in which you get some supplementary instruction, or practice, before rejoining the main program.

Size of Step

Programs vary in the size of each step. In one program you may proceed by very easy stages. In others, you may be asked to make a bit of a jump in going from one question to the next. For obvious reasons, the users of linear programs stress small steps between questions. A small step maximizes the chance of getting the next question right. It thus increases your chance of securing the all-important reinforcement. Conversely, if by some mischance a student misses a question, there is nothing specific the linear program can do about it. He is merely sent on to the next question. Obviously this will give him less trouble when he misses a little step than when he misses a big step. With the branching program, on the other hand, the student can be advanced by fairly large steps, and special treatment is provided if he does make a mistake.

Mode of Responding

In a linear program you make up your own answer and then compare your constructed answer with the answer given on the next page. It would be possible, of course, to provide several ready-made, multiple-choice answers. Constructed answers would be very hard to use in the branching program. They call for very elaborate devices such as providing lists of all *possible* wrong answers. If your answer was among these you would know it was wrong, and you could also be directed to a special branch program that would help you with that particular error.

In actual use, the branching program makes use of a few plausible, preselected alternatives from which the correct answer should be chosen. These are stated as in a multiple-choice question. One choice requires you to turn to one page, a different choice asks you to turn elsewhere. After turning to the designated page you find out whether or not your choice is correct, and you are then instructed to proceed along one branch if you are right, and along a different branch if you are in error.

It doesn't seem to make much difference whether the student constructs his own answer, checks off a multiple-choice answer, or merely *thinks* of an answer. Experiments in general find that one of these modes of response has little, if any, advantage over the others (Anderson, 1967). Nor is there any advantage when students are given their choice between constructing their own answers, as one option, and checking off preset questions, as the other. Some psychologists (e.g., Hickey, 1968) agree that the response mode is unimportant when the student has a good chance of being right in his answers (high-probability responses). They hold, however, that the method of responding may be important when the student is less sure of his answers. Tobias (1969), for instance, found that constructed answers were no better than simple reading of the material when dealing with rather general subject matter. For highly technical material, however, there was an advantage for the constructed answers. Perhaps the issue hinges on the likelihood of a definite reaction. If the material is such that the student is likely to do some real thinking about it, such silent thinking may suffice. For material likely to be passed over or dismissed, however, it may be better to demand some physical response.

Machines and Computers

The basic principles of programming can be incorporated into the programmed textbook, into an ordinary textbook, or even, with some effort, into a simple lecture. But for most people the idea of programmed instruction brings with it a picture of teaching machines or of the shiny apparatus of computer-assisted instruction. And much of the work in programmed learning has been organized around machines of varying degrees of complexity.

Early Use of Machines Long before programmed learning was discussed, many people were intrigued by the possibilities of using machines in teaching. It was obvious that mechanical devices could be used to make reinforcement more immediate, more vivid, and to make sure that it followed a regular and predictable schedule (Lumsdaine and Glaser, 1964). It was also obvious that machines could free the teacher from many routine tasks. You are probably familiar with the Auto Bridge device for practicing the game of bridge without the help of a teacher. Here the player makes a choice, moves a slide and finds whether or not his choice is correct. Punchboards have also been used for the same purpose. There is a group of possible answers. The student selects one of these and indicates his choice by punching the proper hole in the answer sheet. A color or symbol, found at the bottom of the hole, indicates whether or not the choice is correct (Fig. 6.2.) Invisible inks have been used in the same fashion. A student marks his choice with a special moistener and immediately a symbol emerges, or the paper changes color, and in this way the correctness of the choice can be indicated. In other devices a student pushes a button to indicate his answer and one light flashes if he is right, another if he is wrong. In some machines, pushing the right button will cause the next question to move into place. If the wrong button is pushed, the question stays put. Such "self-teachers" have been on the market for a good many years and have been used both for experimental and instructional purposes (Schwitzgebel, 1968).

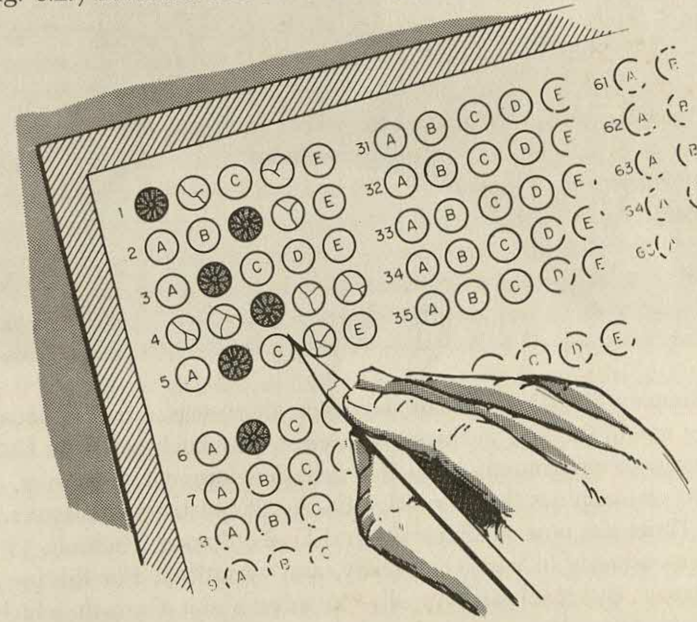


Figure 6.2. The SRA self-scorer. (A red dot appears whenever the correct answer is punched.) Drawing based on copy provided by Science Research Associates, Inc., Chicago, Ill.

Machines and Programming Many of the early machines presented the questions in rather haphazard fashion. Almost all of these early machines, moreover, used only predetermined or ready-made, multiple-choice answers. Following

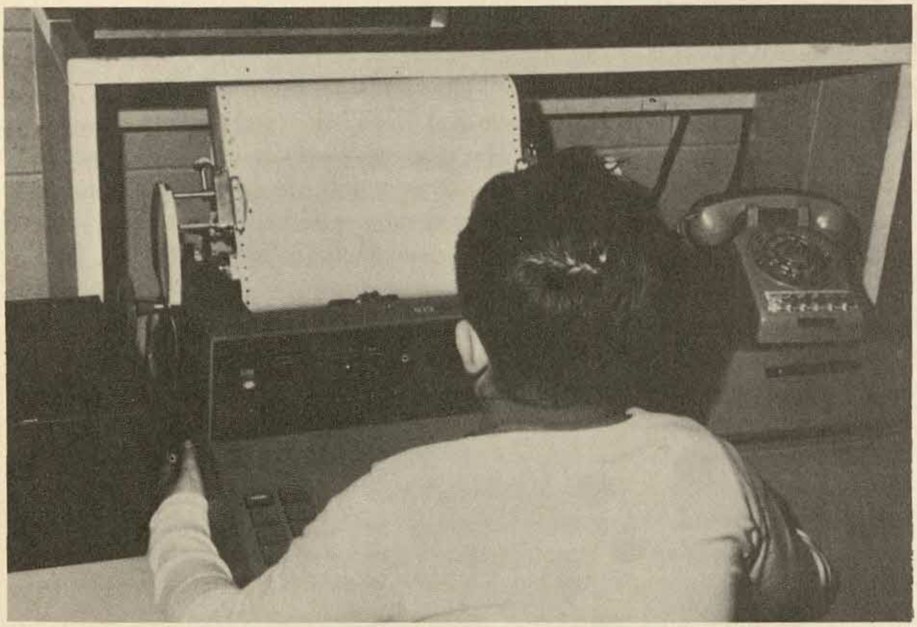


Figure 6.3. A learning device in use. (Otto Schmidt, courtesy BOCES)

Skinner's (1954) proposals, however, there was a tremendous increase in teaching machines, and in this new interest, the machines were thought of in connection with programming. In this new development, moreover, the chief emphasis was on machines that permitted the use of constructed answers.

There are now available several kinds of such machines (Fig. 6.3) They vary. tremendously in cost, complexity, and versatility. For the use of the constructed answer, the machine typically provides a slot through which the question appears. There is a second opening through which the student writes in his answer, either on the same sheet as the question or on a separate tape. There is also some arrangement whereby the learner can move a slide to uncover the correct answer. In the simpler machines this is done when the student advances the paper to the next question. The same movement covers his own answer with a glass slide. In this way he can compare his own response with the correct answer, but he cannot alter what he has written. He can then move the next question into view. The machine is so arranged that one question must be completed before the next question can be seen.

Computers The most elaborate devices, of course, are those used in computer-assisted instruction. The computer itself may be in another building, or in another city. The student works at a "terminal," and these again vary tremendously in complexity and cost (Suppes and Jerman, 1970). The simplest terminal is probably an electric teletypewriter, perhaps modified slightly to suit the particular task. Messages or questions sent out from the computer are typed out on this machine, and the student in turn types out his answers or comments. A plausible dialogue can thus be maintained. Obviously this device is most useful for students mature enough to react meaningfully to letters and symbols.

Instead of this two-way typewriter we may find a telephone speaker for incoming messages and a "touch pad" containing the keys for the student's responses. In more elaborate arrangements there are slide projectors under computer control, or tape recorders, or cathode ray tubes (television screens) for graphic display. The cathode ray tube is often arranged so that it, itself, is sensitive to a "light pen." The student can thus point to various parts of the display, and this response is relayed to the computer. Needless to say, these more elaborate (and tremendously expensive) arrangements are temperamental and subject to breakdown. So far, moreover, there is little evidence that they accomplish more than the tried-and-true—but far from inexpensive—two-way typewriter (Suppes and Jerman, 1970).

Claims for the Different Devices

Each of the devices, from the simple page of print to the most intricate computerized arrangement, claims some advantage over its competitors. Many of these claims deal, not with effectiveness, but with convenience, cost, or incidental benefits such as aid in record keeping. We treat this issue by examining the advantages often advanced for the machines and the computers.

Prevention of Peeking Even the simplest teaching machine provides rigorous control over the sequence of questions, the manner in which the student responds, and the type of feedback he receives. The simplest programmed textbook permits a student to "peek" if he is so inclined. In using a linear program you could easily turn the page and find the correct answer and then write it down. This would be more difficult in the scrambled program, but it could be accomplished if you really set your mind to it. To counter this worry, one might suggest that a moderate amount of peeking in the early stages might actually provide useful guidance and serve as an advantage. In a linear program using very small steps, moreover, the answers are so obvious that there may be little temptation to cheat. In general, however, from one investigation (Anderson, Kulhavy, and Andre, 1971) it appears that when conditions make it easy to peek, many students will find themselves doing so. In this one investigation, at the college level, the students who could (and did) peek accomplished less than those who had to make an overt response before being told the right answer.

The Computer's Flexibility Even the simplest self-contained teaching machine usually presents the program in systematic fashion, and ensures that some response will be made before the correct answer is provided. The psychologists who recommend the computer-assisted devices, however, hold that the older teaching machines are not sufficiently flexible. In machines using linear programs, for instance, the reinforcement does not really depend on the student's response. Different students may fill in different answers on page 36, but all will be greeted by the same correct answer when they turn to page 37. True enough, this "correct answer" may serve different functions for students who have made different responses. But it is not a reinforcement neatly geared to the response. The computer, on the other hand, can provide for almost any number of contingencies: telling a student he is right, and perhaps also repeating that correct answer for him; telling another student that his answer is wrong, and perhaps telling him what his answer should have been (Gilman, 1969).

Going beyond sheer flexibility of reinforcement, the computerized programs can give elaborate pretests and select a program to fit in with the student's score on that pretest. Such a computer program can adapt the reinforcements, not only to the particular answer given, but to the student's general performance over some period of time. It can supply hints or prompts as needed, or as requested by the student. It can also switch in a systematic subprogram of review or remedial treatment, or skip a whole section if either of these steps seems warranted by the student's performance. With computers, moreover, the reinforcement follows almost immediately upon the student's response. He does not have to turn dials, move a mask, or turn a page.

In describing the potentialities of the computer we must not imply that it can improvise out of the thin air. It can take care only of the contingencies which some astute instructor has actually foreseen, and which have been painstakingly incorporated into the program. To anticipate these matters for a whole host of students is a problem that requires an enormous amount of time, testing, and consultation.

Patience and Absence of Caprice Those who stress the advantages of the computer-assisted instruction point to its built-in patience. No matter how late in the day, or no matter how many students have already made the same mistake, the computer cheerfully treats each student on his own merits. The human teacher, on the other hand, may all too often visit on the fifth or sixth erring student the wrath induced by the first or second. The emotionless computer may also have an advantage in the early shaping of behavior. True enough, the human teacher may firmly resolve to commend the imperfect answer of the beginner, or to accept all the efforts of the very dull, but despite his resolve, he may unconsciously reveal pain or dismay at some of those responses when they actually do occur. The computer efficiently reinforces all the responses that fall within the preset limits, with never a telltale grimace to signal its distaste (Seltzer, 1971).

Naturally there are arguments on the other side. The very dehumanized efficiency and cold, programmed commendation strike fear into the hearts of those who value a warm, human approach, with its risk of inconsistency. The financial costs are a source of worry (Seltzer, 1971). Certainly the machines call for a stupendous original outlay. It is possible, however, that the long-range cost may be moderate.

The Effectiveness of the Mechanical Devices

With the great upsurge of interest in programmed instruction in the late 1950s there was a tremendous amount of work comparing programmed instruction with regular classroom procedures and—more properly—with other forms of individualized instruction. The general trend of results shows little, if any, advantage either way (Davis, Marzocco, and Denny, 1970; Anderson, 1967; Feldman, M. E., 1965; Owen and others, 1965; Poppleton and Austwick, 1964; Feldhusen, 1963; Whitlock and others, 1963). Like other forms of individualized learning, programmed instruction often saves a good deal of time for the more able students. The final achievement is about the same as that obtained from typical classroom procedures.

It is difficult to say just which features of programmed instruction enable it to match the instruction of a typical teacher. The highly elaborate details do not seem important. As pointed out earlier, it does not seem to matter whether students construct their own answers, check off multiple-choice answers, or simply read the answers, as in reading a text. The meticulous arrangement of programmed steps—so often stressed—does not always appear important. In a number of investigations (Brown, J. L., 1970; Levin and Baker, 1963; Roe, Case, and Roe, 1962) students do just as well when the elaborate programs are sliced into a strictly random sequence. This does not hold, of course, when the program deals with Gagné-like hierarchy (see Chapters 7 and 10) in which mastery of one subtask is necessary before another can be attempted (Brown, J. L., 1970).

Computer-assisted instruction is a fairly recent development, and has often been used in quite tentative or exploratory fashion. For these and other reasons it is difficult to give a clear-cut picture of its effectiveness. The results of the early experiments are quite varied and again suggest little definite advantage either way. Students learning by computer do about as well as those studying in conventional fashion (Seltzer, 1971; Watson, 1971). In one experiment (Dick and Latta, 1970) a computerized program using the more elaborate cathode ray tube proved to be less efficient than the older teaching machines in teaching mathematics to dull students in grade eight. For bright students there was no difference in favor of either approach.

One of the great selling points of computer-assisted instruction is its ability to adjust to the status of the individual student. Theoretically, the computer can take each student's ability into account and can present a program adapted to his circumstances. So far, however, this feature has been difficult to work out in a truly effective fashion. From the evidence available it does not appear that a program that does not work well for one type of student will prove to be any better for students of a different type or disposition (Davis, Marzocco, and Denny, 1970; Tobias, 1969).

Attitude of Students Students are reasonably well disposed toward the new devices. The very novelty might be expected to have some effect (Chapter 5). At

Programmed Instruction versus Computer-Assisted Instruction

One group of 32 grade eight students was taught by computer-assisted instruction while a second group was taught by a programmed text. Each of these groups contained equal numbers of boys and girls and equal numbers of students with high mathematical aptitude and students of low mathematical aptitude. The subject of instruction was that of significant figures in mathematics. The programmed instruction group used a linear program in which students were given the correct answer after every response. In the computer-assisted instruction the student had to come up with the right answer before being given the next question. These students indicated their answers by pointing to a spot on a cathode ray tube or by typing out answers on a keyboard.

	Scores Immediately Following Instruction		*Retention Scores Two Weeks Later*	
	Low Ability	*High Ability*	*Low Ability*	*High Ability*
Group Using Programmed Instruction	28.4	34.1	24.7	24.1
Group Using Computer-Assisted Instruction	18.8	34.8	16.3	26.4

Differences between ability groups and instructional methods were both significant. The advantage of the programmed instructional technique was significantly greater for the low ability than for the high ability group.

SOURCE: Walter Dick and Raymond Latta, Comparative effects of ability and presentation mode in computer-assisted instruction and programmed instruction, *Audio Visual Communication Review*, 1970, 18(1), 33–45.

the outset, certainly, most students rather enjoy programmed instruction (Eigen, 1963). As we might expect, opinions differ widely, but the consensus is somewhat favorable. College students and graduate students tend to get tired of the approach after a time (Roth, 1963). Elementary school children, however, may retain their eagerness. Even after 34 weeks of studying spelling by use of machines, sixth-grade pupils in one experiment showed no loss of zest (Porter, 1959).

Computer-assisted instruction appeals to most college students even before they try it. After some experience they tend to be even more favorable (Mathis, Smith, and Hansen, 1970). This gain in attitude, however, may be very slight if the student has received many corrections, or if the material was quite unfamiliar. Students who were the most favorable before the experience were also the most favorable afterward.

Effect on Social Development From the outset, the computer people have been somewhat worried about the element of social isolation that may go along with computerized instruction. And, indeed, in one exploratory study (Feldman and Sears, 1970) it appears that first-grade children who are given computer instruction for only half an hour a day may become less oriented to other children. Sutter and Reid (1969) examined the effect of this social isolation on academic attainment, basing their study on college students engaged in problem solving. Half of the students worked under the typical condition of one student to a terminal. For the rest of the class there were two students to a terminal. Taken as a whole, the two groups performed equally well. An analysis showed, however, that highly anxious students performed better when alone, whereas the less anxious were at their best when with a partner. A favorable attitude toward computer instruction was most likely to develop when a submissive student was paired with one who is dominant, or when a dominant student worked alone.

Monster or Panacea?

In our final consideration of these devices, we should try to see their inherent psychological properties and should pay less attention to the novel physical features. Compared with other forms of individualized instruction the new devices seem to be neither an inhuman plunge into technology nor a miraculous dispensation for revolutionizing the basic processes of learning. Consider two students: one reading a textbook all alone in the quiet of his room, the other cranking away on a teaching machine or working at the two-way typewriter. For the time being both are deprived of physical human interaction. On the positive side, each one is being stimulated by words, pictures, or ideas of some kind. Each is responding, the one by thinking to himself or writing notes, the other by writing or typing out answers or checking off multiple-choice questions. Both students find the adequate responses reinforced. For the student with the textbook, this comes about when he anticipates the ideas to be presented and later finds that he is right. For the student at the machine, the reinforcement comes in a more mechanical way. But from a psychological point of view the two processes are highly similar.

All in all it would be amazing if the programmed devices did not turn out to be useful in teaching spelling, the mastery of factual material, and the grasp of concepts that can be clearly formulated. Whether or not they can also be used to teach less tangible things is still a matter of debate. If the evidence for them continues to be favorable, it might turn out that such devices could free the teacher from much routine drill on cut-and-dried factual material and leave him free to concentrate on those areas that demand enthusiasm, inspiration, and flexible guidance. The machine can regularly, accurately, and tirelessly reinforce the overt responses of the student. As yet, however, only a teacher can take into account the hesitancies, doubts, or assurances that accompany those overt responses. And it would take an exceedingly complicated machine to provide useful guidance based on the subtle cues coming from the student's behavior.

Curtailing Unwanted Behavior

Unfortunately it is not always sufficient to build up the strength of tendencies —to make Jimmie *more* likely to say "7," or to be cheerful, or to read for pleasure. At times we must also try to weaken a pupil's tendency. We try to make him less likely to say "x^8" when he sees (x^2) (x^4), to write "neccesary" instead of "necessary," or to think of Spanish as the language of Brazil. How do we do this?

Extinction

When circumstances can be closely controlled, the technique of extinction is often the simplest method of eliminating or reducing the inappropriate behavior. Suppose, for instance, that Jimmie, upon seeing $4 + 3$ had said "12" instead of "7." To use extinction we should make sure that no reinforcement follows this erroneous response. We could try to follow the program used in the animal laboratory, where we arrange things so that the hungry rat fails to get a food pellet when he presses the lever, or that the thirsty animal fails to get a sip of water. Under these circumstances, the act deprived of reinforcement is typically weakened or extinguished and comes to occur less frequently.

Classroom Difficulties with Extinction In the classroom it is often difficult to rely exclusively on extinction. A pupil, for instance, trips another pupil as he goes by the desk. We wish to discourage such behavior. We can easily refuse to commend or reinforce. But does this mean the complete absence of reinforcement? By no means. There is the automatic reinforcement as the victim stumbles forward. There may be considerable immediate casual reinforcement as other pupils snicker or gasp. Under these circumstances the teacher cannot be sure of extinguishing or weakening the tendency merely by refusing to supply reinforcement.

The social situation in the classroom, moreover, makes it difficult merely to withhold reinforcement. What do you do when the pupil makes a response you wish to extinguish? Just say nothing? This is awkward, if not actually churlish. Make some ambiguous comment? This is very likely to be interpreted as a commendation. Pretend not to hear? This would be all right if it worked. Few teachers, however, are good enough actors to get away with such pretense. Very often the student would know that the teacher really had heard. The awkward behavior used to disguise this fact would in itself be a conspicuous event and could even serve as reinforcement.

Frustrative Nonreward The withholding of customary reinforcements, like most things done to human beings, has important side effects. This experience often produces very positive effects, and a whole literature has sprung up about frustrative nonreward (Amsel, 1962; Ryan and Watson, 1968). Frustration seems to be quite marked when the customary reinforcement fails to appear. Older children, especially, go in for more vigorous performance in general. If not excessive, this additional vigor may enhance the subsequent learning. A sought-for and just-missed reinforcement may also, in some complex way, take on additional value or become more attractive (Lawrence and Festinger, 1962); this added incentive may also contribute to subsequent learning.

Introducing Incompatible Behavior

Susan tends to cry when the light is turned out at bedtime. One way to curtail this behavior is to get her to laugh when the lights go out. While she is laughing at a funny song or jolly story, she can't very well cry, and if this comes to dominate, the crying may cease.

Skillful teachers have always made much use of this device. Energy that expresses itself in bothersome hubbub is directed to vigorous singing. The tendency to gaze out the window cannot be indulged if the student is effectively led to look at the display at the front of the room. Sometimes, of course, this procedure is not quite so easy as it sounds, but especially in connection with reproof (see below) it deserves serious consideration.

Reproof and Punishment

When confronted with behavior that should be discouraged, most teachers are inclined to add a note of reproof or verbal punishment. This inclination may come partly from the awkwardness of saying nothing, or from a conviction that we cannot depend on sheer absence of reinforcement, or from a more primitive, widespread, spontaneous tendency to speak out when we see behavior we do not like. Whatever the reason, teachers often administer a reprimand, or arrange for other unpleasant consequences when they observe an act that should be discouraged.

In investigations with children and in the typical classroom situation, the punishment employed is almost always of a verbal or symbolic nature. It consists of a reprimand, a rebuke, or the mere announcement of "Wrong" or "No," although at times this may be accompanied by loud noise or by the loss of privileges. Even these relatively mild forms of punishment, however, have been the subject of great controversy. Skinner has consistently maintained that little can be accomplished by the use of any aversive stimuli—verbal, symbolic, or physical pain.

There is no question that, compared to positive reinforcement, punishment is unpredictable and can often lead to complex and undesirable side effects. From the cognitive point of view, the student must do considerable processing to make

Reward vs. Punishment

The children in each of three grades (two, four, and eight) were divided into three groups for different kinds of treatment. Every child was presented over and over again with two rectangular blocks, each one divided by a diagonal into a white and black triangle. The children had to select the "correct" block which, in this experiment, was always the one with the white triangle long side down. This was just as likely to be on the child's right as on his left.

One group of 15 children found a candy under the block when they made a correct choice. Nothing happened for a wrong choice. A second group was subjected to a loud noise (98 decibels, considered by the children as really "awful") after a wrong choice. Nothing happened after a correct choice. The third group got the candy for the correct choice and were subjected to the loud noise for the wrong choice. Each child had a total of 60 choices.

Percent of Correct Choices in Successive Blocks of Trials

	Trials				
Percent Correct for:	1–12	13–24	25–36	37–48	49–60
Group receiving loud noise only	58	64	78	80	81
Group receiving noise and candy	57	51	51	60	74
Group receiving candy only	54	57	50	56	54

In the trials 25–36, the loud-noise group is significantly ahead of the other two. At the end, the noise group and the noise-and-candy group are both significantly ahead of the candy group, but there is no significant difference between the first two.

SOURCE: R. K. Penney and A. A. Lupton, Children's discrimination learning as a function of reward and punishment, *Journal of Comparative and Physiological Psychology*, 1961, 54, 449–451.

use of punishment, or the simple statement "Wrong." From such correction he learns "This is wrong," but he has to make some inference—much or little—to decide what is right (Greenwald, 1970; Nuttin and Greenwald, 1968).

In his thoughtful analysis of the problem of punishment, Solomon (1964) warns us that our opinions may be influenced by feelings and by sentiments. Punishment has a harsh and medieval sound. It would be nice if we could get along without it. Perhaps we can. Perhaps we should. But the decision should not be based entirely on our feelings of what would be pretty or nice. To some extent we should be guided by the evidence. If the implications of that evidence call upon us to do things that violate our integrity or our basic principles, we can, of course, deliberately turn our backs on it. But we should do so knowingly and deliberately.

The Cautious Use of Punishment The evidence suggests that the effects of punishment are hard to predict. Very often punishment will inhibit a response. At times, however, it does not. In general it would seem that punishment with its undependability and its suggestion of harshness might well be minimized whenever possible. At times, however, sheer extinction may not work in the classroom, and here even some followers of Skinner (McAllister and others, 1969) provide for the use of direct, verbal, and sternly given reproof when this seems necessary. In one experiment reproof was used as an entering wedge in dealing with strongly entrenched disorderly behavior. The stern rebukes used in this study are much stronger than the mild reproofs which ordinarily spring spontaneously to the teacher's lips, and which find their way into the elaborate computer programs (Gilman, 1969). In completely suppressing these expressions of disapproval, the teacher might well appear unnatural, strained, or uncaring. It is unlikely that used in moderation such expostulations will do much harm; at times they may help.

There is much agreement that punishment will inhibit an undesirable response for a time at least (Solomon, 1964; Estes, 1944). During that time, moreover, there is a chance to instigate and reinforce incompatible behavior (discussed above). During the time that your admonition has stopped George from turning around and bothering the student behind him, you might get him to look at something at the front of the room, and make sure that his attentive behavior is reinforced. To the extent that this new response is reinforced and comes to dominate it will rule out the behavior you wish to discourage.

The Problem of Negative Reinforcement In reinforcement theories of learning there is much emphasis on the reinforcement that comes from the cessation of pain or distress. This comes about when some aversive stimulus is acting on the student, and when the student makes a response that is followed by the removal of the stimulus. If such a sequence might provide negative reinforcement, the removed stimulus would be called a *negative reinforcer*.

In strict operant theory, a stimulus should not be labeled a negative reinforcer unless its removal does, in fact, produce an increase in response probability. Speaking more loosely, however, we can assume that many of the aversive stimuli applied as punishment would work in this way. As soon as punishment ceases, the effect should be to reinforce whatever the student is doing at that time. In imposing any punishment, therefore, we inevitably set the wheels in motion for the cessation of punishment, and in doing this we have made it likely that some unforeseeable response occurring at that time will be reinforced. In the various chapters of Part III we lay great stress on the fact that the long scolding must end sometime and that the response that the child happens to be making at that moment is the response that will be reinforced.

Summary

This chapter emphasizes successful academic behavior rather than the inner feeling of success. To get a student to become more likely to make a successful or approved response, we try to make sure that whenever conditions are appropriate he makes the response and thereupon receives some reinforcement or reward. At times the "appropriate conditions" consist of a specific stimulus ($6 + 8$), and must be discriminated closely. At other times the conditions are quite general (whenever the class is in session).

Many physiological or automatic consequences of behavior (reinforcements) are not under the teacher's direct control. Following an acceptable act, however, the teacher can permit children to carry on a desired activity, can show approval by word or glance, and these things can be made contingent on the desired behavior. Often apparatus or equipment can be so arranged that a correct action will be followed by a physical result, such as a signal from a computer. To facilitate immediate success, reinforcement should be prompt and lavish. To facilitate long-term retention, however, it is better to delay the reinforcement and to apply it to only a fraction of the responses.

At the outset of learning the great problem is to get the child to make a correct response or one we can legitimately reinforce. Behavior shaping is one solution. In this procedure any approach to the desired response is reinforced at first, the criterion for later reinforcement becoming more and more stringent. Guidance, or the use of supplementary stimulation, is another or correlated solution. By hints and prompts and cues the child is led to make the desired response. Gradually these supplementary stimuli are reduced (stimulus fading). The supplementary stimuli can be supplied through manual guidance, peeking at the right answer, the use of rhetorical questions (answered by the teacher himself), and by warning pupils away from predictable errors. The techniques of behavior shaping and supplementary guidance are often jointly employed, guidance being emphasized at the outset. Unguided, contingent reinforcement becomes more effective as competence develops.

Programmed instruction and various mechanical devices have been developed to make reinforcement more systematic and precise. Programmed textbooks may use either linear or branching programs, may require the student either to select an answer or to construct his own answer. Linear programs typically proceed in small steps. Branching programs may employ larger steps and provide devices for dealing with errors.

The more elaborate mechanical devices include teaching machines of various degrees of complexity and programs for *computer-assisted instruction* which are intricate in the extreme. The machines provide more precise control over the stimuli available to the student at any one time (He cannot "peek" ahead at the answer or let his attention wander over the page). The more elaborate computers can also be programmed to react in specific form to predictable answers the student might give. Computers can also administer tests at any stage—perhaps contingent on the student's performance—and can adapt the subsequent program to the results. Clearly the computer is likely to be more patient and systematic than the flesh-and-blood teacher. So far, the various devices have seemed about as effective as traditional classroom instruction. Compared to each other, one type of device appears to be about as efficient as another. Students enjoy them for the most part, especially at first.

Teaching calls for the discouragement of some kinds of behavior. In the laboratory this may be accomplished by withholding all reinforcement (extinction), but it is difficult for the teacher to be sure that the student will receive no reinforcement for his acts. The withholding of customary reinforcement also induces frustration. Verbal reproof or other forms of social or symbolic punishment are also used, despite the pronounced controversy about the effectiveness of any punishment. Verbal punishment or reproof will often hold an undesired response in abeyance for a time, permitting the teaching of positive acceptable acts during the interim. Punishment, however, has worrisome side effects. Once it starts it has to stop. Its cessation brings negative reinforcement and strengthens any behavior taking place at that time.

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Suzanne Szasz

7

Structure and Meaning in Learning

Most people need little urging to believe that meaningful learning is better than arbitrary or rote learning. We are all convinced that it is more interesting and more worthwhile to learn and to teach in a meaningful way than it is to rely on sheer memory. Some people, indeed, feel that there should be little place in the school for material that cannot be presented and grasped in a meaningful way. Professor Ausubel (1968) holds that such learning is too inconsequential to justify consideration. In his very influential book on this topic, Professor Bruner (1960) has called attention to important structures that can be appreciated at quite early ages and has urged us not to neglect the opportunity to develop these useful concepts.

Granted that everyone admits the importance of making teaching more meaningful, we still face the task of finding out just how this can be done. We also ask why it is that the meaningful approach is more effective. At times, moreover, we might adopt a cautious attitude and ask if there is any danger of going too far in our reverence for meaningful material and in our scorn for rote learning.

Meaning and structure are important for the teacher in two different ways. In the first place, these are things that the teacher can use as aids in the general tasks he undertakes. Whether he is teaching an isolated fact (the Missouri is a tributary of the Mississippi) or a profound and inclusive principle ($E = MC^2$), he can utilize certain structures or meaningful principles to aid him in his efforts. Both grand principle and isolated fact can be learned in a meaningful way. But meaning is much more than a useful dodge for teaching one thing or another as those things happen to turn up in the curriculum. Meaning dominates the curriculum itself. Using any procedures that are necessary, we spend much time in helping the student to grasp the large meaningful principles that enable him not only to remember but to understand the facts that he encounters. It would be nice if these meaningful objectives, like all educational objectives, could be learned in a meaningful way. But when meaning becomes an end in itself it assumes a different status than when it serves as a convenient tool for accomplishing any task we face.

In this chapter we treat both aspects. We consider meaning a means to minor ends, as well as the dominating end that gives meaning to our work. In treating either aspect we must talk about the nature of meaning and its many facets. We must also show how these facets are to be manipulated, and whether we think of meaning as a lowly serving boy or as the grand, ultimate goal of our efforts, we should know something of those facets and the ways in which they function.

The Meaning of Meaning

To ask what we mean by the concept of meaning is something like asking for a definition of a definition. We must use the concept of meaning to explain what the concept means. Ausubel (1968) thinks it is easier to start off by describing meaningful learning, and then, from this knowledge, work around to the description of meaning itself. To many students of the problem (see Creelman, 1966) the meaningfulness of an idea or event depends on the number and kinds of associations that it evokes. An idea never comes by itself, but brings along other ideas and feelings and inclinations that are linked with it. An abstract idea such as "glory" or "remorse" brings some of the distinctive context in which the idea has been encountered, and may even bring images of flags flying, or faces haggard with pain or dismay. Vivid images are especially likely to accompany concrete ideas such as "ocean surf" or the "Rites of Spring." A physical object or stimulus not only elicits a given response but also initiates, or half-initiates, a host of other responses. For every act that is actually carried out, there may be many placed on a "neural alert." Through neural states or by other means, these might-have-been responses play their part in our experience and behavior. In the same way, the workers in information theory make much of the ghostly, might-have-been stimuli that influence our behavior.

The four lists of words on this page are intended to illustrate some facets of meaning. They represent different ways in which one statement, or one display of items, may be more meaningful than another. We see, first of all, that the separate items in the first list are themselves lacking in meaning, whereas each of the items in the second list has more claim to meaning. The items in the first list are *unfamiliar.* They strike you as bizarre, and as things that have little real *relevance* to the important things in your life. In their failure to qualify as the words they seem to ape, they may also be offensive or irritating. These unfamiliar words are also low in *association value.* In contrast to words like "river" or "door," the nonsense syllables are incapable of calling to mind other related ideas. They produce little *imagery.* In looking at these nonsense syllables you have no vivid image of a particular door or a definite river. In claiming a greater amount of meaning for the items in the second list, then, we could mean that each of these items is more familiar, that it has more association value, and that it is more capable of evoking vivid images.

1	*2*	*3*	*4*
XAH	RIVER	FOOT	HELP
YIX	DOOR	MILK	BRING
ZEQ	PEOPLE	HAND	THOSE
PYB	GENERAL	WATER	WEARY
QAJ	BLOW	EAT	SAILOR
COJ	HOUR	ARM	MEN
YOF	GIRL	EYE	SAFE
GYK	EARTH	DRINK	AGAIN
VEF	CALL	FOOD	TO
XUW	BOOK	EAR	SHORE

But the meaningfulness of a list, or other display, does not reside entirely in the meaning to be found in each of the separate items. To grasp this point, read over the third list two or three times and then try to write down all the words you can remember. Don't worry about the order. Just try to repeat as many words as you can. Do this now before you read any further. When you have finished, compare the words you recalled with the list as given.

Do you find that you have tended to put parts of the body in one group and the food items in another? Many people do. This is an example of *clustering* (Bousfield and Cohen, 1955). It shows that these categories really lead you to organize the items into groups, even when you don't intend to.

Often when we state that a display has much meaning, we refer to the fact that the elements are easily grasped. Perhaps they may automatically come back to us in clusters. Perhaps, with little effort, we can deliberately arrange them into groups or *chunks.* Because of this feature we are no longer faced with ten separate items. We need now deal only with two or three fairly coherent groups or chunks. Grouping or chunking provides a primitive kind of *structure.* As this structure becomes more prominent and more inclusive, the material becomes more and more meaningful. After reading the fourth list, for instance, you may find it hard to think of it as a list of ten items. Instead, it may strike you as a single, organized statement. And when thus seen as a single, organized unit the display reaches new levels of meaning.

In and of itself, a coherent structure gives meaning to a group of words or other items. By enabling you to see the material as a single unit, moreover, this structure reinvokes, at a new level, the attributes of meaning already discussed. The whole general idea—of sea rescue, for instance—can be familiar rather than strange. This whole idea could be rich in association value, vividly reminding you of the age-old problem of peril on the sea.

Making Use of Meaning and Structure

Of all the facets of meaning, that of structure, or pattern, or organization has the greatest appeal to the intellect, and it is the facet that most people have in mind when they urge us to teach in a meaningful way; or to work for understanding; or to avoid mere learning by rote. As pointed out earlier, the large patterns of thought can be used to help us grasp ideas or principles that are themselves highly structured. These large and compelling patterns can also be used to enable us to master an isolated fact if that should be our goal.

Structures Readily Available

Fortunately the structures that facilitate learning are not difficult to obtain. They are everywhere at work and, indeed, are often difficult to avoid. According to the theory of gestalt psychology, the structure or pattern is the most basic aspect of experience. We first of all perceive some structure. The isolated, separate details are experienced later. In listening to a musical selection, we first become aware of the general melody and only later, if ever, do we notice the individual notes. In reading the words on this page, you first become aware of a word or phrase, and you may never notice individual letters that make up the word. In our experience, moreover, the general pattern remains fairly constant even when many or all of the details are changed. The melody is the same even if it is transposed to a different key and an entirely different set of notes are employed. The word is much the same whether printed in roman type or italics, in this type face or that, whether printed or written (Fig. 7.1). As any proof-

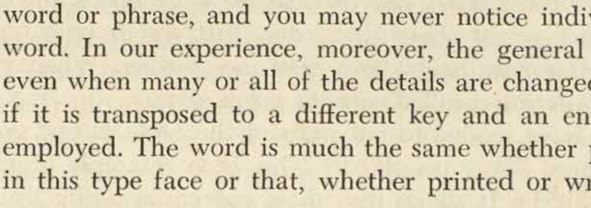

Figure 7.1. A constant pattern in the face of varying details.

reader will attest, it is even the same, all too often, when one of the letters is inadvertently left out, or two letters are transposed.

When a pattern is compellingly grasped, essential details may be experienced whether they are there or not (Fig. 7.1.) The last few notes of the melody may be "heard" even if the sound is turned off. The punch phrase of a well-structured limerick may be grasped even when the reciter hesitates to pronounce it. Just as essential details supply themselves with little or no effort, so less essential but helpful details are grasped with great ease. When clearly aware of the general pattern of the poem, we can easily memorize the individual words that fit in with the pattern.

Along with the patterns that dominate our immediate perceptions, there are other cognitive patterns or structures that dominate our cognitive life. Piaget, you will remember, made much of these. At any stage of his life the child will have developed some schema, some structure, into which each new experience must fit, either by being painlessly assimilated or by the arduous exercise of accommodation. By school age the child will have some forceful, if faulty, notions of classes and subclasses into which most new ideas must fit in this way. If the new idea (domestic duck) can be so presented that it fits neatly, compellingly, and validly into some existing structure (the class of birds), great economies are attained. With no more effort this new idea immediately acquires all the properties that in the mind of the child belong to that class. As its class membership becomes better and better established, he sees clearly that the duck must lay eggs, lack teeth, and have two legs.

Using Larger Existing Structures

When about to present a new idea, we should try to identify the structures which the child already understands and into which this new idea would fit in ready and compelling fashion. These desired *superordinate categories* could consist of the structures which, according to Piaget, almost any child acquires from his informal experiences with the world. These more inclusive categories could also consist of the more academic things that have already been taught in the school—negative number, constitution of the country. Either kind should do, provided it plays an effective part in the child's thought processes, and provided it is a category into which the new idea fits in ready and persuasive fashion.

From this point of view, the student would be considered ready to study a given task if he had already acquired the superordinate categories into which the task would neatly fit. If he lacked such superordinate categories we might feel inclined to wait. If compelled to proceed, anyhow, we would have to reconcile ourselves to a less meaningful approach.

Superordinate categories, of course, are not the only thing to be considered when we are deciding whether or not a student is ready for a given task. Gagné, whose general position is discussed later, has pointed out that to reckon with the new task the child must also have the *subordinate capabilities*. Just as he should

Some Advance Organizers for this Chapter

A. Using Structure to Help in General Learning
  1. Most material to be learned has some broad structure.
  2. This structure, if grasped, greatly facilitates the learning of the material.
  3. Sometimes the structure is so obvious that little need be done to help the student see it.
  4. Sometimes a less obvious structure can be brought out by emphasis (underlining), or by the use of advance organizers, such as these.
  5. Sometimes the material has no structure that the student can see. It may be completely arbitrary (names of state capitals) or the structure may be too subtle or involved for the student to see.
  6. When structure is missing or too hard to bring out, the student can often use an artificial structure (rhymes, jingles, mnemonic pegs).

B. Using Principles of Learning to Help Attain Structure
  1. To master a complex structure (separation of powers), the student should have some mastery of the concepts, and the names used in discussing the structure.
  2. The teaching of a concept (justice, democracy) calls for careful use of both positive (justice) and negative (injustice) examples.
  3. Mastering structure is much like other forms of learning except for questions about:
    - The amount of guidance (as opposed to student discovery) to be given.
    - The problem of transition from dealing with concrete examples to dealing with the abstract structure itself.

not study typing until he has enough strength to strike the keys, so he should not study about the characteristics of ducks until he can say the word, and perhaps until he can link the printed symbol with a picture or model. There are many other kinds of readiness, including interest or motivation. The availability of subordinate structures is only one aspect.

The structure we invoke, be it a scholastic structure or one developed from less-directed experience, should be compelling and should include the new idea without forcing us to go in for lame explanations over a poor fit. Some structures, moreover, may be more intimately built into our experience than others, and these "deep" structures may provide a more valuable aid (Davidson and Dollinger, 1969). In getting a child to comprehend the dietary requirements of a dog, for instance, it might be better to link this problem to the natural life of the dog in the wild than to his peculiar enzymes and chemical makeup. The facts, of course, would fit into either structure.

Providing Structure Before Learning Begins

College seniors majoring in education were assigned a brief article on the physiology of adolescence. After 20 minutes of study they were examined for mastery of the material. The students were then matched or paired on the basis of this examination. One member was assigned to an "advance organizer" group. The other was assigned to an "historical introduction" section. Later both groups were to study an article dealing with the metallurgical properties of carbon steel. Prior to studying this major article, however, the advance-organizer groups spent two 5-minute periods, (48 hours apart), in reading a passage which set forth the main categories of the major paper (differences between metals and alloys, advantages and limitations of each, and so forth). During the same two 5-minute periods the historical group read a selection on the historical evolution of methods of making iron and steel.

After these different orientations, both groups spent 35 minutes in studying the basic paper on steel. Three days later all students were given a test on the basic paper.

The two groups had already been matched for performance on the earlier paper. After further matching on sex and field of specialization there were 40 students in each group.

	Final Score
Advance Organizer Group	16.7
Historical Introduction Group	14.1

The difference was significant between the .05 and .01 levels.

SOURCE: D. P. Ausubel, The use of advance organizers in the learning and retention of meaningful verbal material, *Journal of Educational Psychology*, 1960, **51**, 267–272.

The Use of Advance Organizers

Whenever new material is to be linked to an existing, larger structure, that larger structure should be revivified or made conspicuous. At times an incidental reminder will do. At other times there may be need for a definite review.

To make sure that the larger structure is waiting to receive the new material, Ausubel (1960) has recommended the use of *advance organizers*. Prior to studying the new material, the pupil goes over the main points of the structure into which it will fit. He gets a clearer idea of the superordinate categories and of the types of material they are able to include.

In general, when these broad, subsuming or superordinate concepts can be presented in clear and familiar terms, the detailed material is more readily mastered (Scandura and Wells, 1967; Ausubel, 1960). The advance organizers seem to be genuine organizers of the material, and not substitutes for it. Students who only read the organizers do not automatically master the detailed material itself (Bauman, Glass, and Harrington, 1969).

To be effective, advance organizers should be ideas or concepts that are already familiar to the student and with which he feels at home. You want the student, for instance, to understand and remember the reason for the dog's panting. As an organizer you might remind him that "all warm-blooded creatures have some way of getting rid of excess heat." You then go on to say, "Not being able to sweat, the dog uses shallow breathing, or panting, as a way of evaporating water from his lungs without getting more oxygen than he needs." Unless this matter of getting rid of excess heat really means something to the student, however, it will not help much. Organizers that work well for older pupils, say, grade five, may not help for those who are a year or so younger (Gagné and Wiegand, 1970), and those that work for bright children may do less for the dull child (Allen, 1970).

Organizers should also be larger or more inclusive than the material they are supposed to organize. Getting rid of excess heat, for instance, is a more inclusive notion than is the panting reflex in dogs. At times, however, things are used as organizers which are not really much larger than the material to be learned. You want the student to learn and remember the fact that young howler monkeys spend much time chasing each other through the treetops. As an organizer, you point out that "young howler monkeys like to play." This is not much more extensive than the fact of "chasing."

Some alleged organizers, rather than invoking a superordinate class, use a coordinate idea, and rely largely on analogy. We may say, for instance, "Instead of sweating, as we do, the dog gets rid of his excess heat by shallow breathing or panting." Human sweating in no way includes canine panting. It is an exceedingly familiar phenomenon, however, and may serve as a useful analogy, if not as an organizer in the strict sense.

When an organizer is not very familiar, and also does little to generate the material to be learned, it may become a hindrance rather than a help. It may be something additional that the student feels he has to learn. At the very least, it may be confusing or distracting (Gagné, 1969).

There is a converse to this problem. When you do use familiar, convincing, and inclusive organizers, it is likely that the material studied will become merged into this general organizer or structure. With the passage of time this new material may be completely absorbed into the structure and may lose its status as a unique fact. To understand and remember the general pattern of early June sunrises in Anchorage, Alaska, it would help to know something of the earth's inclination and its revolution around the sun. But you would remember the *general* arrangements. A person lacking this organizing structure might do just as well, or even better, in remembering the precise time of sunrise on June 8.

Many different things could be regarded as organizers and each of them in turn could have many different effects. It is not surprising, then, that the "advance" aspect of the organizers has not always been important. For some material, organizers or superordinate concepts have proved just as effective, or more effective, when coming at the end of the material as when serving as an introduction (Bauman, Glass, and Harrington, 1969). When used in this way they serve very much as Rothkopf's postquestions (Chapter 5), and may have about the same effect (Allen, 1970). You may get something like an organizer effect merely by highlighting sentences in the material to be read (Cashen and Leicht, 1970). Such organizers, if they can be so labeled, are neither "pre" nor "post," but run throughout the material. Organizers have been used after the learning is completed and just before the pupil takes a test. Used in this way, they seem to aid him in retrieving the information once mastered (Gagné and Wiegand, 1970).

Using the Structure within the Material

In teaching any item, say, a sonnet by Keats, you can call upon two kinds of structure. First, there is a larger structure in which this whole item fits. It is part of the tradition of sonnets. It echoes one of Shakespeare's themes. And so forth. If a student has, or can quickly acquire, a confident grasp of the larger external structure, you will help him a great deal by showing how this item fits into the external structure.

But quite apart from the larger setting into which it fits, the sonnet also has an internal structure of its own. Much of this could be brought out without reference to the broader structure. In the same way, the last list of words on page 213 also has an external structure—it links up with the broad notion of prayers for those in peril on the sea—and it has an internal structure. It has the structure inherent in a sentence, and it has some pretensions to corny rhythm or cadence.

When presenting new material that has clear and obvious internal structure, it is wise to present the general pattern first. If the student is to learn a new musical selection, let him grasp the entire melody before he works on the detailed passages. If he is to learn a play, let him understand the plot before he begins to memorize separate lines. If he is to learn to swim or to play badminton, be sure that he knows the *main* points to be kept in mind before he concentrates on the details. If he is to study the history of a certain culture, let him see something of the broad, general outline.

Just as there are customary sequences of thoughts or phrases, so there are traditional sequences of words that we have come to expect. These familiar sequences form part of a structure, and this governs our expectations. If I say "Alice in ———," you expect to hear "Wonderland." Because of this structure we experience confirming reinforcement when the structure if honored, and are bothered or distracted—perhaps amused—when it is violated. You read the words "There is no doubt that many people kettle chain and hock." The word "kettle" gives us a jolt, not because it is a strange word, but because it does not seem to belong here.

Now it is possible to honor these expectancies, to avoid any major jolts, and still to write nonsense. Consider the following: "Won't do for the members what they most wanted in the course an interesting professor gave I went to at one o'clock stopped at his front door and rang" (Miller and Selfridge, 1950). This says nothing meaningful and yet no single word is especially out of place. No single word violates our customary expectancies.

When the material to be learned approximates ordinary English sequences, it is, of course, less annoying. More important, however, it is also more redundant. In reading ordinary English, as has been pointed out so often, we regularly anticipate what is coming. Insofar as we can correctly anticipate the next few words, these words, strictly speaking, are unnecessary. Even without seeing them we already had the information they provided. In other words, they are redundant. But such redundancy provides exceedingly valuable and relevant reinforcement whenever we anticipate correctly. And this ability to anticipate correctly becomes more pronounced as the nonsense material comes more and more to approximate the structure of English prose (Salzinger and others, 1962).

Grouping and Chunking Even when no more compelling structure is present, the material may lend itself to grouping or chunking. A formidable list of words can be broken into less frightening groups of two or three. With little help from you, the material may arrange itself in natural groups or *clusters*. Take advantage of these processes. They help morale and also add somewhat to efficiency. When dealing with material almost completely devoid of structure (see below), these processes, with some elaboration, may become the chief basis for success.

The Role of Familiar Sequences Suppose that you are teaching a new number system to the base "seven." This means that the pupils should memorize new symbols to correspond to the first seven numbers. When he thinks of "zero" you want him to think of one of these new symbols, and when he thinks of "one" you want him to think of another symbol. In presenting these familiar numbers, each with its new symbol, you might be wise, certainly at the outset, to present the number-symbol pairs in the familiar one-to-seven order (Grotelueschen and Sjogren, 1968). Since ultimately you want the pupils to think of the symbols no matter when they occur, you would wish to switch to a random presentation after some skill had developed.

When Structure Is Missing or Elusive

Any material, of course, has some structure, trivial or substantial. Often, however, the structure is so weak or so irrelevant that we may as well ignore it and teach the subject as if it lacked any inherent or compelling structure. The sequence of letters in the alphabet, for instance, can be considered completely arbitrary. So are many of the names of rivers, oceans, or state capitals. Spelling in the English language is distressingly arbitrary, if not capricious, and most people must master it on a rote basis or by using some spurious, contrived structure.

Some things to be learned have an undoubted intrinsic structure, but this may be so elusive that it cannot be used as it stands. At times this elusive structure can be brought out by a simple hint or statement. A student looking at Figure 7.2, for instance, could readily feel that there is some more elaborate structure underlying the splotches and marks that he first sees. If he is left on his own he might have great difficulty in detecting the elusive structure. By merely telling him, however, that it represents a boy on a tricycle, you may bring out this structure in vivid and compelling fashion. From then on, the general pattern will dominate and the student may find it difficult to see anything else.

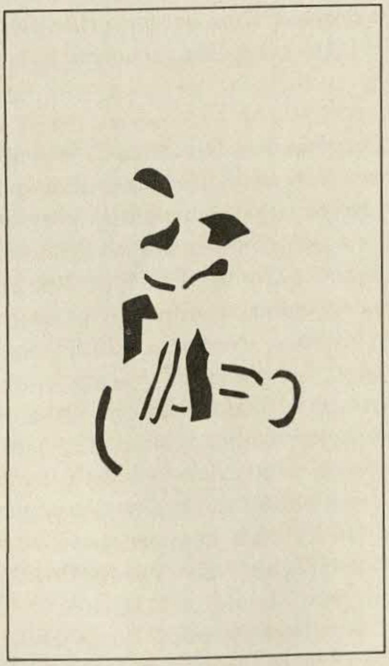

Figure 7.2. Illustration of an incomplete structure. Redrawn by permission of the publisher from Roy F. Street, *A Gestalt Completion Test.* (New York: Teachers College Press, copyright 1931 by Teachers College, Columbia University), p. 61.

At times we can bring out an elusive structure by a simple statement, or by a wave of the pointer, or by masking out distracting details, or by emphasizing the relevant parts of a musical theme. There are other times, however, when the essential structure of the new material may be very difficult for the students to grasp. If the new material is a symphony, for instance, it may be possible that the overall "architecture" is beyond the younger students. Yet there may be individual passages that such students can readily master and appreciate. Similarly a pupil in grade six would probably find it hard to understand the reasons for each step he takes in extracting the square root of a number. Yet there are many recurring minor patterns in that process that are easily within his grasp.

In our search for structures that make our work more meaningful and effective we should not forget that any given set of materials will fit into many different structures. Some of these are intrinsic and intellectually exciting. Others are banal, arbitrary, and limited. But we must not assume that the structure that appeals to the older and more experienced teacher will also mean great things to the child at his own particular level. The grand design of a play or novel may not fit into a compelling existing structure in the mind of a grade nine student. The rules for extracting the square root of a number are beautifully and rigorously derived from larger principles of mathematics, yet these principles may exert little compelling control over the thought processes used in grade six.

Difficult Structures as Objectives When the complex structure, so intriguing to the teacher, is beyond the immediate powers of the students, it is foolish, of course, to try to use it as an aid in presenting new material. Often, new material presented so as to emphasize an elaborate and important structure proves no easier to learn (Munro, 1959) or has only a slight advantage (Binter, 1963) than the same material presented in an arbitrary or rote fashion. In one experiment, for instance, Newman (1957) had students learn the meaning of the symbols used in electrical wiring. For some students these symbols were grouped in a very logical pattern. Other students were given the same symbols grouped in helter-skelter fashion. The latter students actually came out ahead.

An insistence on a structure which fascinates the teacher but which eludes the child, far from aiding the student, may merely place an additional burden on his shoulders. Under such circumstances, children solve the problems as best they can and then obligingly give the approved rule for doing it as they did.

Obviously we should not ignore or discard these elaborate and complete structures just because they lie beyond the immediate grasp of the student. Although useless or harmful for introductory purposes, such structures make up the important final goals of teaching. The meaning inherent in these structures is the kind of meaning that we are supposed to teach, and not the kind of meaning that we can use as a device for teaching other things. Regard the more elaborate structures as ultimate goals, and not as mere introductory aids. Use minor patterns and structures to develop some understanding of the symphony or play, and then, when a moderate understanding is attained, try to bring out the larger structure or architecture. Use minor recurring patterns to help the student acquire some proficiency in extracting a square root. After that, try to develop an understanding of the underlying reasons, if this understanding is important in its own right.

Chunking and Coding The process of *chunking* and coding has been emphasized in the work of Miller (1956). Something like it is often used in a parlor

The Structure Developed by the Teacher Does Not Always Help

A total of 30 airmen who had just completed basic training were randomly assigned to one of two groups. Both groups were given a pretest on identifying 20 electrical symbols (a capacitor, a transformer, and so forth). The 15 airmen in a "free-style" study group were then merely given the twenty symbols, not in the same order as in the test, with the name appearing after each symbol, and told to study the list.

The other group was given an organized presentation. Here the symbols were sorted according to some predominate feature. Five symbols all featuring a wavy line, for instance, were placed in one group. Five others, all having a prominent circle, were placed in another group, and so forth. The instructor presented these by groups, being sure that the symbols in one group were mastered before the next group was presented. The common feature in each group was stressed. Seven of the airmen went over the lists once (about 8 minutes), and 8 went over the lists twice (about 12 minutes).

In both cases the initial test was given again immediately after the learning exercise.

Airmen Studying for		*Average Number of Symbols Recognized*
8 minutes	Free-Style Study	13.1
	Organized Presentation	9.6
12 minutes	Free-Style Study	17.0
	Organized Presentation	13.5

For both time periods, the superiority of the free-style study was significant. The greater attainment for the longer period of study was also significant.

SOURCE: S. E. Newman, Student vs. instructor design of study method, *Journal of Educational Psychology*, 1957, 48, 328–333.

game or trick by which you and a confederate might astound your friends. Suppose that there are several (six or seven) people that both you and your confederate know, and that both of you are quite familiar with the telephone numbers of each of these people. You both know that Sam's number is 413 2964, Mary's number is 825 6351, and so forth. Your confederate starts the game by innocently speculating on how many separate numbers people can recall after one hearing. The other people, of course, have no notion that these numbers will have anything to do with telephone numbers. He reads out 413296, which is the beginning of Sam's number. Most people will get that one without any help. Next he gives Mary's number, 8256351. This will be possible for some people, difficult for many. For you it is simple, "Mary's telephone number." At 8 or 9 digits many people will drop out. With your secret knowledge, however, you may be able to go on 25 or 30 digits. You will hear:

7284156825635141329644837291

but you will group them 728 4156 825 6351 413 2964 483 7291 and will name each group Bob Mary Sam Ellen

As you listen to the digits being read, you must first of all be able to group them or hear them in a *chunk*. You must then quickly think of the *name* of that chunk. Next you must remember each name in order. You could probably remember as many as 5 or 6 names in order, giving you perhaps 35 to 42 digits. But much of your attention will be taken up with identifying the familiar chunks, and the effort necessary for this may limit you to 4 or 5 names.

In giving the numbers back, you think of the names in order, and as soon as you think of the name or code, you translate it into the numbers.

Our parlor game is a bit of a cheat in that your confederate has to give you numbers that are "prechunked." If any other member of the party started giving you numbers at random, you would be in trouble. The same principle, however, can be used in real-life situations provided you can find some rapid way of chunking the material or provided you can deal with material that is on the verge of being chunked.

Our familiar decimal system of numbers is not suited to modern computers and they must employ the *binary* system instead. The binary system uses only 0's and 1's. We use 0 in binary for our ordinary 0, and 1 for our 1. When we come to our 2, however, we have used both 1 and 0 and since we cannot use any other numbers, we must use these again in a new combination, namely 10. Going on, 11 in binary is our 3. Our 8 is 1000 in binary.

You can see that you will soon run into a long string of digits. Our ordinary 35, for instance, appears as 100011, the number 1069 as 10000100011. To remember the binary equivalent of even a modest ordinary number becomes a very difficult task. To solve this problem, some workers have learned to break binary numbers up into chunks of (say) 3 digits each, and to give names to the 8 different chunks that are thus produced. Instead of remembering a long string of digits, they merely have to remember a few code digits or a few syllables. If they could learn to recall a series of 7 or 8 such digits or syllables, for instance, they could thus remember 20 to 24 binary digits.

To use chunking in an efficient way, we must be quick in giving names to the chunks. Unless the material is continuously before us, moreover, we must be able to hold it in our short-term memory long enough to permit us to group it, or chunk it. In this short-term memory, it will be recalled, material remains for a few seconds in raw form, available for instant replay. It is during this time that it can be chunked and coded, or given a name. Names used for these labels should be easy to recall. If the naming is partly done for us, and if the names used are meaningful for us, much of the problem is solved. The letters TLY or BTL all by themselves, for instance, would be difficult to remember. If they are presented as hoTLY, or as douBTLess, however, they come already chunked (last part of "hotly") and more or less named. Under these circumstances they will be more readily remembered (Lindley, 1963). When the letters are meaningful as they stand (WAS, for instance), the addition of other letters adds nothing and tends to produce confusion. Since the letters were already chunked and named, the added letters merely introduce a second rival name.

Supplying Contextual Linkages When a series of unrelated words is to be memorized—as when you try to remember the streets you must pass before you reach your destination—it is often helpful to link them together in one long plausible sentence, or failing that, into a few shorter sentences (Levin, 1970; see also Anderson, 1970). To remember cat, log, boy . . . , for instance, it would help to think of a sentence, "the cat jumped over the log which the boy had dropped . . ." and so on, working out a "House that Jack Built" story. Using a list of fourteen words, Levin found that the sentence was not much use unless it linked at least three words. A long sentence including all fourteen words was the most effective.

When sentences are used, the words to be linked should be joined by a definite verb (Anderson, 1970). As yet it is not clear whether there is any advantage for a vigorous verb (the *dog* bit the *man*) over a milder and more general connection (the dog goes with the man). Reese (1970b) found no dependable difference between the two kinds of connections. Prepositions (the dog behind the man) are also useful, but conjunctions (the dog and the man) contribute little or nothing. A number of suggestions have been advanced to make sense out of these facts. Some of these (Reese, 1970b) stress the fact that the more effective arrangements are those that permit or invite the most vivid images. The other suggestion, already mentioned (Davidson and Dollinger, 1969), points out that some sentences invoke a primitive or deep structure and reflect significant truths, whereas others are merely formal grammatical arrangements (the noun verbed the noun).

Adults find such sentences more effective when they are required to work them out themselves (Anderson, 1970; Jensen and Rohwer, 1963). For young (grade two) children, however, this is not so, even when such children really are able to construct their own sentences (Goulet, 1968). Perhaps the additional attention and manipulation help if the effort does not bring too much distraction and if a reasonable number of items are incorporated into one structure.

Connected Context as an Aid to Rote Memory

A total of 112 children in grades 4 and 5 learned a list of 12 words. For some children the words were given one after another with *no grouping*. For others the words were grouped in a few long sentences, each sentence containing many of the words; or in a larger number of short sentences, each containing a few of the words. The longest (one sentence) organization contained all 12 words (italicized) and read as follows: The grey *cat* jumped over the *log* and crossed the *street* to find the *milk* in the new *house* by the blue *lake* where the young *boy* lost his left *shoe* while catching the *fish* on the wooden *boat* during the *storm* that came last *year*.

A 4-sentence organization began as follows: The grey *cat* jumped over the *log* and crossed the *street*. We found the *milk* in the new *house* by the blue *lake*.

Type of Sentence Grouping Used	*Number of Trials Required To Learn the List*
All 12 words in one sentence	7.6
2 sentences, each with 6 of the words	6.1
3 sentences, each with 4 of the words	6.6
4 sentences, each with 3 of the words	5.9
6 sentences, each with 2 of the words	7.6
12 sentences, each with 1 of the words	7.0
No sentences; 12 isolated words	8.1

Taken as a group, the first four conditions were significantly better than the last three. (This breakdown was decided upon before the results were seen.) None of the other differences were significant.

SOURCE: Joel R. Levin, Verbal organizations and the facilitation of serial learning, *Journal of Educational Psychology*, 1970, **61**(2), 110–117.

Mnemonic Pegs and "Memory Systems" In addition to sentences that embrace a number of items, teachers and desperate students in the past have made use of other gimmicks such as jingles and rhymes. Medical students think "On old Olympus topmost tower . . ." to help them remember the order of the cranial nerves. Many children have utilized "Thirty days hath September," or "In 1492 Columbus crossed the ocean blue," or "*i* before *e* except after *c*." To reckon with the fact that "accommodation" has two *c*'s and also two *m*'s remember that if you are to accommodate two *m*en you will need two *c*ots. These crude devices, which bring a blush to our cheeks, are not to be scorned if no more intrinsic structure presents itself. Even when there are intrinsic structures available, skeptical and frightened students may rely on gimmicks. There are good and compelling reasons, for instance, for the steps to be taken in translating a compass course into a true course. These intrinsic reasons show that you start with *C*ompass course, apply *D*eviation, get the *M*agnetic course, apply *V*ariation and get the *T*rue course. But generations of midshipmen have chorused, "Can Dead Men Vote Twice?" Airmen, going from True course to the desired Compass course recite, "True Virgins Make Dull Company."

Conceptual pegs are held to play an important part in many kinds of learning (Paivio, 1970), and many artificial aids are based on convenient and well-known mnemonic *pegs* to which events can be linked. The alphabet provides such a system of pegs. A student who could not remember whether or not Madison preceded Monroe as President was reminded that *Ma* precedes *Mo*. Another student knew that the rods and cones of the eye had specialized functions, one serving in daylight and the other in twilight. He could not, however, remember which was which until it was pointed out that the *c* of cones and the *d* of daylight belonged together in the alphabet, while the *r* of rods and the *t* of twilight had a somewhat similar proximity.

Our system of counting also provides a useful system of pegs. If we can firmly link one idea with five, and another with six, we can easily keep these two ideas in the correct sequence.

Professional memory experts, who can recall long lists of words after one hearing, make much use of these pegs. For any number (one) they select a correlated word (bun) and clothe these words with elaborate and bizarre images (see below). Each new idea is then vividly linked to one of these conspicuous verbal or numerical pegs. Even amateurs, when given ready-made pegs (bun, shoe, tree), can use them to master a list of forty unrelated words (Wood, 1967; Yates, 1966). The amateurs, of course, spend much time in concocting individual images and in linking these to the pegs that are provided.

Meaningfulness of Individual Items

So far we have discussed the things—profound structures or banal associations—that link separate items in the material to be learned. But each item, as we have seen, can vary in its claim to meaning. *XAH* is repellent in its lack of meaning. *HOME* is loaded with meaning. To deal sensibly with the latter term, as a matter of fact, we must not add to its store of meaning, but eliminate much of what is there.

Familiarity One facet of meaning, as we have seen, is sheer familiarity. And this is one feature of meaningful material that may make it easier to master.

Making the Individual Items More Familiar

Each of the 20 college students in this experiment was required to learn 4 lists of 12 nonsense syllables each. Prior to this experience each student had spent some time each day for 4 days in becoming familiar with the 24 individual syllables that were to be used in two of the lists. They had no such experience with the syllables on the other two lists. In this familiarization process the student looked at a card on which was printed the first two or the last two letters of a nonsense syllable. He then attempted to supply the missing letter. Whatever the result, the card was turned over and the correct spelling shown. This was repeated until all 24 syllables could be completed without error.

The cards were shuffled after each run so that the syllables would not appear in the same order from one trial to another.

After being familiarized with the individual syllables on two of the lists, the students learned these two lists in a precise serial order. They also learned two similar 12-syllable lists containing syllables not seen before.

The average student required 7.2 trials to achieve a reasonable mastery of the lists with unfamiliar syllables, but only 5.8 trials to learn the comparable lists made up of familiar syllables to the same level of mastery. This difference was significant between the 5 percent and 1 percent levels. To attain a more exacting level of success, the students required 19.4 trials for the lists of unfamiliar syllables but only 15.2 trials for the lists of familiarized items. This latter difference, however, was not significant.

SOURCE: D. A. Riley and Laura Phillips, The effects of syllable familiarization on rote learning, association value, and reminiscence, *Journal of Experimental Psychology*, 1959, 57, 372–379.

Familiarity, or more extensive acquaintance with material, will help even if the items continue to be arbitrary or nonsensical (Riley and Phillips, 1959). After several repetitions of a list of nonsense syllables, for instance, you would be less appalled at the prospect of using them as names. It is true that some help may come from the fact that you began to see some meaning in the labels (Underwood, 1959). But even apart from this, sheer familiarity or further exposure would help.

Imagery One of the things that add to the meaning of an individual word is its power to evoke a definite image. This matter of imagery, by the way, which behaviorists and near-behaviorists were glad to ignore, is once more receiving a good deal of attention (Reese, 1970a). At any rate, it has long been known that for adults, nouns are easier to learn than adjectives, and concrete nouns easier than abstract. For young children, however, concrete nouns are no easier than equally familiar abstract nouns (Goulet, 1968). For older children and adults, pairs of words are easier to learn when one or both of these words is linked to a powerful image. For younger children, however, imagery is less useful (Rohwer, 1970). It is possible that younger children make less use of imagery in any form, or that they keep their image-making activities in one compartment and their learning in another.

Developing Meaningful Relations

Having seen how meaning and structure can be used as a tool to facilitate learning, we now turn to the problem of developing new meaning as an end in itself.

Claims of Validity

Meaningful relations regarded as ultimate outcomes must be scrutinized more carefully than meanings used as supplementary aids to other objectives. In trying to get a student to understand some basic principles of electricity, for instance, you might make use of some parallels from hydraulics, or the flow of liquids. At this point you might not spend much time in deciding whether the student's ideas of hydraulics represented the last word in elegance and precision. So long as it helped him attain a true grasp of electricity it would serve its purpose. When you turn, now, to the teaching of hydraulics as your major objective, you cannot adopt this indulgent attitude to liquids and their activities. Misconceptions which could be ignored in the casual analogy must now be dealt with in serious fashion.

The Problem of Readiness

When you use meaning or structure as a tool to facilitate other learning, you should be sure that this tool on which you rely is available before you start your teaching. And this is what Ausubel and Piaget urge you to do. Before utilizing the child's larger knowledge of mammals to help him understand some more detailed facts about dogs, you should be sure that he has that knowledge (Ausubel) and you should also be sure (Piaget) that he readily applies the properties of the larger class (mammals) to the subclass (dogs). For this task, readiness comes from having achieved a mastery of a fairly large principle, or rule, or structure.

When you turn to the converse task of teaching the larger principle itself, readiness takes on a different character. Now you ask if he has the detailed and subordinate skills that are necessary to deal with the principle or rule you hope to teach. He must be able to see the words, for instance, to identify them, perhaps to use them with precision. This aspect of readiness is discussed in more detail in Chapter 10. This is the problem to which Gagné (1970) has given a good deal of attention. In contemporary American educational psychology, Gagné's name is associated with the *attainment* of general principles in much the same way that Ausubel's name is associated with the *use* of existing meaning to learn other things. Since these two psychologists are concerned with quite different objectives, they naturally stress different procedures. Looking only at these different procedures, some people have seemed to detect a rivalry or conflict. This suggestion of contention vanishes, however, as soon as you realize that there are steps needed to build a house or other structure, but these intermediate steps have no necessary relation to the steps needed to make use of that structure once it has come into existence.

Gagné-type Hierarchies

The principles or rules that Gagné sees us teaching are oriented largely to the schoolroom. These are the formal principles and rules of physics, and biology, and literature, rather than the more indigenous principles dealing with classes and subclasses such as those stressed by Piaget. Piaget thinks we acquire these fundamental structures with little aid from formal tuition. The principles stressed by Gagné, on the other hand, would seldom be learned unless formally taught.

At the top of his hierarchy, as a matter of fact, Gagné places, not the mastery of a principle, but the *solving of problems* (Chapter 8). In solving a problem, of course, he may well attain a new principle. (To decipher codes such as these, look for the most frequently used symbol.) In general, however, the mastery of a certain number of principles is a prerequisite for problem solving. To master a principle, in turn, we must make use of *concepts*. To understand the dog's relation to man, for instance, we must be at home with the concepts of dog, man, and, perhaps, relation. In the mastery of concepts, as we shall see in a moment, the student is required to make *multiple discriminations*, and relevant discriminations. The dog differs from the cat in several ways. To be able to distinguish dogs from nondogs, the student must learn to make different verbal responses to the differences that matter. But this, in turn, implies the ability to link words to things, and words to each other. There must be some capability for *verbal association*. In all but the most unlikely situations, moreover, these associations themselves are based on combinations or *chains* of simpler S-R associations, and underlying the simpler *stimulus-response association* (seeing the dog and saying "dog"), and saying it in a way that gets the necessary results, we find the primitive process of the conditioned response, or *signal learning*, in which the child mechanically echoes an earlier response to a new stimulus.

Utility of the Hierarchy Gagné (1970) and his students have shown that, when teaching the mastery of a complex principle, there is some advantage in concentrating on the subordinate skills. Students taught the subordinate skills mastered the final problem with little additional instruction. Similarly, in teaching the concept of a noun as the subject of a sentence, Eustace (1969) found it helpful to begin with a noun as a specific name, and then to work up to the use of a noun as an abstract general concept, before teaching the role that nouns in general play in the sentence.

On theoretical grounds it would seem that the hierarchical approach would be most important in teaching a complex task in which there is considerable risk of failure. By insisting on the prior mastery of the prerequisites we maximize the likelihood of success. Such precautions, of course, would be especially in order whenever failure would be a serious matter to the child himself, or would mean a serious waste of time for all concerned. When this is so, we would be wise to go to some trouble to find out if the child already has the subordinate capabilities, and then teach those that are lacking.

Caution in the Use of the Hierarchy The existence of a hierarchy does not necessarily mean that the task must be presented in hierarchical fashion. There are some tasks in which relative failure, or lack of complete success, is quite tolerable, and we might well let the child plunge into such tasks even though he lacks some of the subordinate capabilities. Consider the problem of speaking a sentence in *correct fashion.* Clearly this is a task calling for subordinate capabilities. To succeed, the child must be able to enunciate each sound, and each separate word. But this does not mean that we should prevent him from trying to speak in sentences until he has achieved all these capabilities. There is much to be said for letting him try this more inclusive task, accepting a very imperfect performance, and also letting him develop the subordinate capabilities while he enthusiastically, but imperfectly, works on the global problem. It depends on the consequences of an imperfect performance. Swimming in a shallow pool might be undertaken before all the subordinate niceties were under control. Parachute jumping might be a different matter.

The same warnings apply to the problem of testing for the subordinate capabilities. If a child plunges into the main task and succeeds, you know, with no further testing, that he has the necessary subordinate capabilities. To test these out of context or in isolation, moreover, may be a problem. Context, as we have seen, often acts as a powerful aid. A singer who cannot hit a certain high note in isolation may succeed when this subordinate capability is part of the aria itself. Subordinate capabilities—like individual words—which completely escape us in isolation may spring to mind when the context demands them. The reciting student, in groping for a word, may back up and begin the line again, hoping that the context will supply the missing item. The fence that we cannot jump in a cold, isolated test may be no obstacle whatever as we run from the charging bull. Sometimes you can never tell whether you have the subordinate capability or not until you try the major task.

Using the General Principles of Learning

Concepts and principles come fairly high on the Gagné hierarchy. Their mastery, however, follows the same general principles that apply to more primitive forms of learning. The student's attention must be directed to one set of conditions rather than another. He should be alert, but far from anxious or tense. When he comes up with the desired understanding, he should encounter reinforcement. This often takes the form of encountering some interesting results, or seeing things in a new way. Working models that permit manipulation can be used to take advantage of this kind of automatic, impersonal reinforcement. Obviously the intrinsic reinforcement may be supplemented by the teacher's expression of satisfaction, and by the serious regard of one's fellows.

The Problem of Guidance In acquiring more elementary skills, much stress is placed on the production of a reinforceable response, and various stratagems have been devised to bring this about—behavior shaping, guidance, and the preempting of possible erroneous responses. In the teaching of concepts and principles, however, there has been some feeling that direct guidance would somehow contradict the essential goal. By providing too much guidance we may deprive the student of his sense of discovery or accomplishment.

There are several things we can do to increase the probability of success without leading the student right up to the answer. Following Gagné, we can be sure that crucial subordinate capabilities are developed. We can make use of displays or arrangements that point the way to the principle rather than obscure it. The electrical equipment, for instance, can be arranged so as to follow the wiring diagram. Much can be done by the mere arrangement of the material. Simply by placing rainfall maps of North America and South America side by side, for instance, we may have automatically arranged things so that the general principle is almost staring the student in the face. Similarly, in biology, there are many parallel sketches of the skeleton of man and horse (Fig. 7.3), or parallel diagrams of frog and man, and these can be depended on to point the way to the mastery of some of the general principles of anatomy or physiology.

Guidance from Concrete Contexts At various times we have made much of the fact that pure abstract relations are a recent acquisition in the development of the individual and, perhaps, in the development of the race. During the crucial formative years the child has come to use these abstract principles, and to feel at home with them, only insofar as they apply to concrete events.

The student is more likely to come to trust new abstract principles if we let him acquire this confidence by seeing the new principles confirmed again and again by facts that are familiar. Later, of course, we hope that when success follows success the student will feel less and less need for continual reassurance from concrete particulars. By using the abstract principles of dead reckoning, for instance, he may be able to navigate his plane for longer and longer distances between comforting visual checkpoints. Relying on principles of logic and mathematics, he should confidently accept conclusions about imaginary numbers, and conclusions which, at first glance, seem to run counter to the ideas we have derived from concrete particulars. Relying on the laws of probability, he should see that after fifteen heads in a row, the next toss has still a fifty-fifty chance of turning up heads.

As our ultimate aim we clearly hope to reduce the student's dependence on the guidance provided by concrete experience. But it is unwise to rush things, and even in the final stages we should welcome the urge to check high-sounding generalizations against down-to-earth particulars. To see what happens when we ask a student to deal with concepts outside his experience, we need merely glance at the familiar student "boners" which enliven the pedagogical literature. A grade-four youngster, for instance, reads about the army officer who provided his men with "quarters for the night." We can easily understand his visual picture of the officer handing each soldier a twenty-five-cent piece to pay for his lodging. A second student is said to have stated that "furlough" meant "mule." To support his unorthodox definition he produced a picture of a soldier riding a mule, underneath which was the unmistakable caption *Civil War soldier going home on a furlough.* In one place Lochinvar declaims,

> "I long woo'd your daughter, my suit you denied.
> Love swells like the Solway but ebbs like its tide."

One student paraphrased the first line thus: "I long woo'd your daughter but you wouldn't give me back my clothes." The experience of this modern student enabled him to contemplate Lochinvar carrying on his wooing unhampered by the inconveniences of clothing. His experience also suggested a reasonable interpretation for the unfamiliar concept of denying a suit.

The Need for Concrete Referents We have said that even after he has moderate competence in the use of new abstract concepts, the student should be encouraged to check these with earthy concrete particulars. Free-floating, unanchored abstractions can be useful, but they can also be a nuisance. These independent abstractions, incorporated into our thought processes so recently in the history of the race, and at such cost, become very precious to us. Not only do we use and rely on the general abstraction when there is no concrete particular available, but we often seem to prefer the abstraction, or generalized description, and ignore the concrete particular that stands waiting to be used. We know that George is fifty-three years old, for instance, but in communicating this to someone else we agonize over whether to describe him as middle-aged, early middle-aged, or old, ignoring the fact that a simple statement of his actual age would take care of the matter, and do so with no risk of ambiguity. People who agree on the concrete act that has taken place will argue endlessly about the general abstract label to be used. Should we call it democratic? liberal? realistic? When the concrete event is the important thing, we should try to prevent our students from hiding this event behind vague but contentious abstractions.

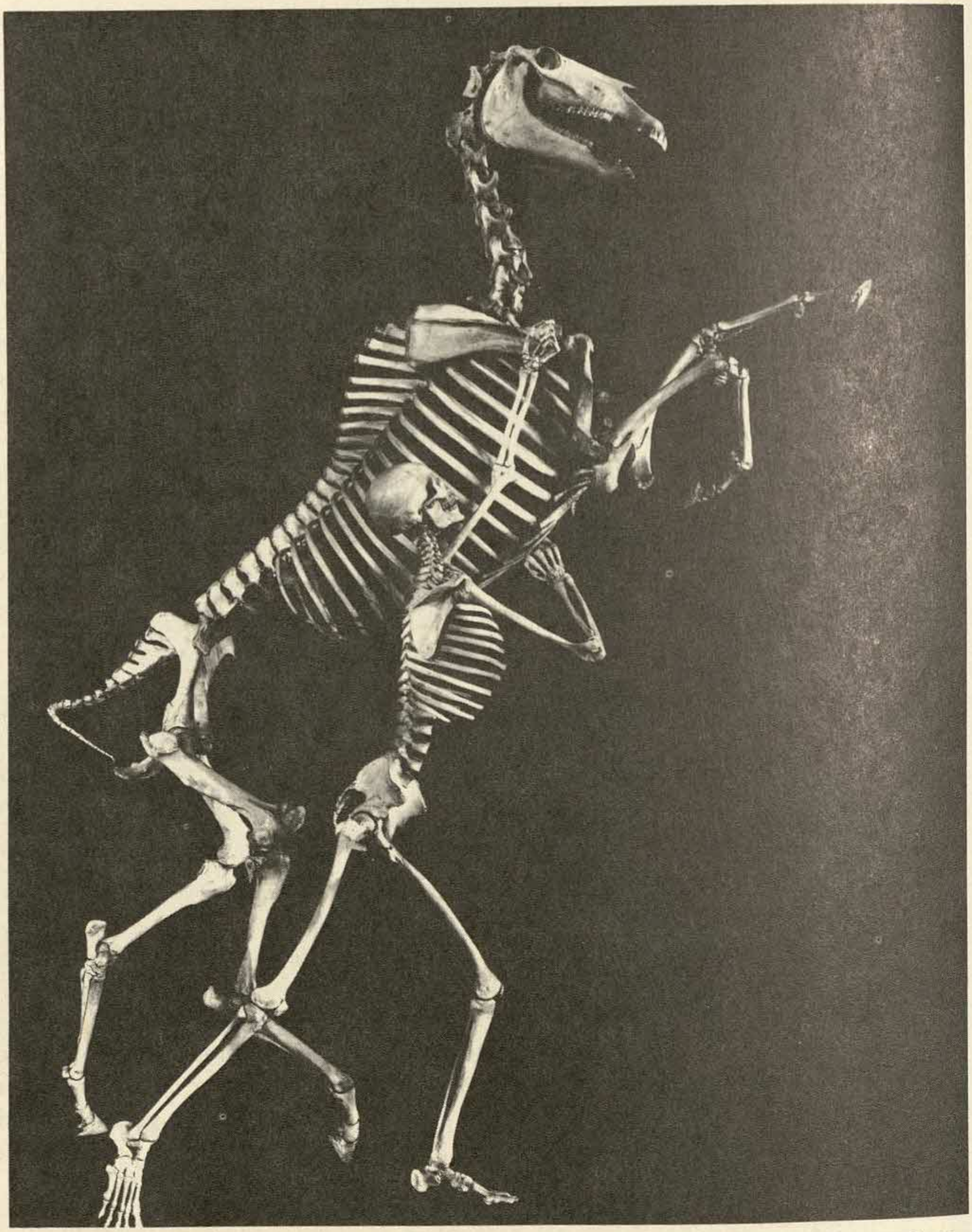

Figure 7.3. A skillful arrangement of materials can bring out important relations. Photograph of skeleton of man with skeleton of horse, courtesy of The American Museum of Natural History.

When students violently disagree in discussing some abstract concept, moreover, we should insist that they give concrete examples to see if the argument concerns the truth behind the labels or deals chiefly with the phrasing of the label itself.

Guided Learning versus Discovery In the history of education there has been much argument about the idea of learning by discovery. This argument has come to the fore again with the introduction of "new" scientific curriculums, and with the emphasis on teaching science in more meaningful fashion. A number of writers (Bruner, 1961; Hendrix, 1961) have claimed that principles or rules have genuine meaning only when they are independently discovered by the student himself. To expect a student to comprehend important principles from straightforward explanation is regarded as a hopeless venture, if not as an improper, arbitrary, authoritative exercise of adult power.

One might urge a more moderate position. The data (Ausubel, 1961) suggest that completely independent discovery, even if feasible, is seldom as effective as learning with reasonable amounts of direction or help. As pointed out in Chapter 6, too much guidance or direction can interfere with mastery of a principle. But the lack of any guidance whatsoever is seldom advantageous, either. Certainly, from the point of view of immediate mastery, as opposed to long-term retention or transfer, we find better results when students are given a certain amount of guidance (Kornreich, 1969; Guthrie, 1967) than when they rely on their own unaided discovery.

Although the evidence does not give clear-cut support to the more extreme demand for learning by discovery, there is something to be said for the general atmosphere of discovery. We often do find superior learning when there is an emphasis on student activity and initiative, when the search for a principle is clearly kept in mind, and when many examples are provided. This general approach, however, includes many features over and above sheer independent discovery on the part of the students. Any one of these features, moreover, may account for the frequent superiority of the general approach (Ausubel, 1961). Among other things, the greater ego involvement may lead students to spend more time in practicing the tasks, or thinking about them, outside the formal practice periods (Kersh, 1962).

Clearly it seems unwise to make a fetish of unaided student discovery. It is to be hoped that many important principles can be grasped without asking the students to go through all the efforts that led to the original discovery of those principles. On the other hand, some emphasis on discovery, coupled with features often associated with discovery, should be valuable. When a rule or principle is discovered by the student himself, he makes better use of it when he must apply it to unfamiliar material. This "transfer" effect does not always appear (Worthen, 1968; Worthen and Collins, 1971; Rowell, Simon, and Wiseman, 1969), but there is enough positive evidence (Anastasiow and others, 1970; Guthrie, 1967) to give it some support.

Guidance versus Discovery in Mastering an Efficient Strategy of Problem Solving

A student is shown a display made up of two letters arranged somewhat as follows:

T **x**

He knows that he is to be shown a number of such displays and that each will contain the two letters T and X but that they will vary in size (small or large), heaviness (light or boldface), and position (left or right). In each display one letter exemplifying a rule will be right. For the first display the student happens to choose T and is told he is right. He now consults a card listing all the possible conditions that could be the right cue and checks off those that are still possible after his first trial. The rightness of his first choice, for instance, could come from the fact that it was T rather than X, or that it was large, or that it was light, or that it was on the left. Other displays are presented and are treated in the same way. After solving the first problem, the student was informed that a new cue would now be used. A total of 24 problems were to be solved.

One group of 33 students (Discovery) was given no help after the original instructions. A second group of 33 (Guided Discovery) was given the same reminder after every four problems, namely, that after making the first choice, there were four cues known to be possible. A third group of 33 students (Programmed) was also given help after every four problems, but this was geared to the errors the student was making (e.g., you can eliminate cues from trial to trial; after the second trial, you should have only two possible cues left). A student who came to understand the ideal "focusing strategy" could solve any of the problems on the third trial.

	Discovery	*Guided Discovery*	*Programmed*
Number of each group acquiring the focusing strategy	5	20	11
Percent of problems solved *after* acquiring strategy	81%	86%	81%
Number not acquiring the strategy	28	13	22
Percent of problems successful on fourth choice	66%	60%	60%

SOURCE: L. Berrel Kornreich, Discovery versus programmed instruction in teaching a strategy for solving concept-identification problems, *Journal of Educational Psychology*, 1969, 60(5), 384–388.

From our understanding of ego needs, we would expect, on theoretical grounds, that a student would pay more attention to a rule or principle if he could see that principle as organizing and highlighting the vague insights he has already come to feel as a result of his own experience. It is possible that many of the delights of great literature spring from this process. The great writers put into precise and exciting language the vague and confused thoughts toward which the rest of us have groped. As a result of our own experience, each of us has formed vague and fuzzy insights regarding the pangs of remorse or the tragedy of indecision. It remains for Shakespeare, however, to thrill us by picking up these vaguely felt presentiments and returning them to us as insights that are neat, compact, and magnificently ordered. But even here there is some disagreement. Hendrix (1947) holds that the neat verbalization of such insights may actually interfere with later transfer to other tasks.

In the face of this controversy we suggest the same general rule that is used frequently throughout this text: provide a reasonable schedule of reinforcement throughout. Even at the outset, try to get the student to make a reinforceable response, or to achieve an acceptable understanding. If, within a reasonable time, he can do this through independent discovery—wonderful! Under these circumstances you can reinforce both the understanding attained and the tendency to try to discover principles. Perhaps, however, his independent efforts are not likely to produce much in the way of a reinforceable achievement within a reasonable time. When the students are immature or possessed of little aptitude, or when students of any type are first beginning a task, you can expect more success, and can provide more reinforcement, if you supply a fair amount of guidance (Anastasiow and others, 1970). For older, brighter students who are already familiar with the material, you may be able to use a program of pure discovery and still provide an adequate diet of reinforcement.

The Teaching of Concepts

The grasp of a meaningful principle, as pointed out earlier, often demands the prior mastery of the concepts involved. The teaching of those concepts, moreover, is not unlike the general problem of teaching for meaning. Teaching a child the meaning of democracy or reciprocity, for instance, is much like helping him to understand the reasons for international alliances or disputes. There are special problems involved in this area of the teaching of meanings, however, and these are treated at some length.

The problem of concept mastery has received a tremendous amount of attention from psychologists and educational psychologists. The excellent summary by Clark (1971), on which the following account is largely based, cites some 250 experimental investigations.

The attainment of a concept is an example of the Piaget process of assimilation. We attain a concept when we come to make the same response to several dissimilar stimuli. The child has some concept of "dog" if he can make this response to pekinese and dobermans, to terriers and collies. As far as the term "dog" is concerned, the differences in size and furriness are to be ignored. These differences are assimilated and—with respect to this concept—are treated as invariant.

A few restrictions must be noted. Obviously this single response must be restricted to one class of objects. It would not do if the child used the word "dog" for everything he saw. Some psychologists would also insist that in addition to using the correct label the child who has mastered the concept could tell someone how to tell a dog from a nondog, and do this without depending on examples. He should be able to display the basis for making his decisions, or should be able to describe the attributes (hair, four legs, barking) that matter. Hunt (1962) thinks that a computer could make this known to a human being who could inspect the wiring diagram and, if so, a computer might be said to "have" a concept. This would not be true of a rat, however, even though he could correctly make one response to circles (in general) and a different response to squares in general. The rat has no way of communicating (to us) the basis for his decisions.

Factors Affecting the Teacher's Task Teaching is endlessly concerned with the development of concepts. The child's success often hinges on whether or not he has a clear concept of "three" or of "equals" or of a "square." He must be able to separate the concept of "alive" from the related concept of "lively." He must see the difference between such easily confused things as democracy, justice, kindness, and niceness.

In helping students to master a particular concept you will frequently be unable to choose the circumstances. You must teach the concept that is needed at this time, and you must teach it to the students in your class. But, even so, it may help to realize that some tasks are easier than others. At times, moreover, you may have some control over which concept to teach now and which to leave until the children are older.

Age, of course, does make a difference. Remembering Piaget, you will readily realize that some concepts might be almost impossible to teach to the preoperational child, but would be ridiculously easy for the child about to move out of the stage of the concrete operations. Concepts that can be managed during the stage of formal operations might be difficult or impossible during the stage of the concrete operations.

In deciding about the difficulty of a concept, one of the first things to decide is whether that concept is conjunctive or disjunctive. A *conjunctive* concept, such as "dog," must possess each and every one of several attributes. To be included in the concept of "dog," for instance, an animal must be warm-blooded, *and* a mammal, *and* be able to bark. Lack of any of these attributes would mean that the creature was not a dog. A *disjunctive* concept, on the other hand, merely demands that its members have at least one attribute. A "strike" in baseball, for instance, does not mean that the ball must pass over the plate *and* that the batter must swing at it. Either one of these attributes would justify the umpire in classifying this event as a strike. To be included in the concept of "uncle," to take another example, a man could be your father's brother, *or* your mother's brother, *or* your father's sister's husband, *or*, etc.

Typically, conjunctive concepts are easier to learn, especially when the student must puzzle things out for himself. When dealing with conjunctive concepts, each new attribute limits the number of objects that can be included. When dealing with disjunctive concepts, however, a new attribute may open the door to a whole new group of members.

Some conjunctive concepts are easier than others. For younger children it is easier to master a concept of concrete objects (dog or automobile) than geometrical forms (circle, square). Geometrical forms, in turn, are easier than abstract numerical concepts (twice, half).

When deciding whether an object is a dog or not, or whether it is an uncle or not, some characteristics are critical and others are incidental. For dogs, four leggedness (barring amputation) is critical. Sex is not. For uncle, sex is critical, age is not. Things are easier when the *critical* features are conspicuous and the incidental features not. The concept of dog probably meets these criteria fairly well. The concept of "lion" should be more difficult since the irrelevant sex differences are quite conspicuous. "Uncle" should be difficult since the irrelevant feature of age is conspicuous, or certainly some age differences (child versus adult) are conspicuous. It also helps if there are not too many critical features to take into account. "Dog" might be difficult on this score since there are quite a few criteria that an organism must meet before it can be classified as a dog. Things are also easier if the critical features are not likely to be confused with the incidental or noncritical features. We would face difficulties if the dog's inability to sweat (critical) might be confused with his preference for cool places (noncritical). This difficulty becomes marked in teaching such a concept as a living object. Here the feature of "interesting movement" is really irrelevant since it is present in nonliving waterfalls, and is absent in living seeds. This movement, or activity, however, can be confused with some critical features of living objects, and we find that even adolescents may attribute life to a watch, or to a lively stream.

Principles of Learning and the Teaching of Concepts Being faced with the task of teaching a given concept—difficult or easy—to a group of students—young or old—how do you go about it? Or, more accurately, what psychological principles or information can you use to aid in the task?

First of all, you will find that the principles of learning already discussed will apply to this task as well as to others. In this task, mistakes are extremely likely, and there is tremendous response competition. Under these circumstances, anxiety will make for trouble. Use any device that you can to reduce it. In the early stages, with its many failures, the task itself becomes very frustrating. Do what you can to remind pupils that slow progress is inherent in the task, and that it is not due to their stupidity. The more difficult or complex the concept, the more this reassurance is needed.

There should be a rich diet of reinforcement, especially in the early stages. Each successful response should be confirmed and acknowledged. The pupil should also have time to savor his success, and think about it, before being presented with the next step. In contrast to other forms of learning, however, the experiments, so far, have not shown any advantage from changing to partial reinforcement as skill develops.

For older students, some concepts may be taught by sheer exposition. By deduction and by analogy, for instance, such students may grasp the concept of a fourth dimension, or the square root of a negative number (Johnson and Stratton, 1966). This is fortunate, since it would be difficult to find the practical examples of these things that we would need if we set out to teach them by induction. Apart from highly abstract notions, however, you will find yourself teaching many concepts inductively by means of examples and illustrations. This inductive approach, moreover, is used in most of the experiments from which our principles are derived.

Suppose you are teaching young children the concept of a square. If you read much about concept formation, by the way, you may get a little tired of this illustration. You may get the idea that when psychologists are not teaching dogs to salivate they are teaching children the concept of "square." But it is a good illustration and stays fairly close to the experimental evidence, and at the same time it permits applications to other concepts.

You will need *many* illustrations of squares (positive examples) and a *few* illustrations of things that have some of the characteristics of squares but which still do not qualify as squares (negative examples). The differences between the two kinds of illustrations should be quite marked. The nonsquares should be conspicuously unsquare. Noncritical, or irrelevant, features should be very inconspicuous, especially at first. The examples should not have an unusual color, nor involve an unusual substance, nor should they be unusually large or tiny (Amster, 1966). The critical features (four sides, closed figure, sides of equal length, right angles) should dominate.

The experiments suggest that you get better results if you first present a few positive examples and omit negative examples. All these examples should be present at the same time and should remain for inspection. The examples in the group, moreover, should not vary greatly in size or in any ordinary noncritical features. They should not vary at all in unusual or noteworthy noncritical features. It would not be wise, for instance, to have one made of paper and another of cloth.

At this stage it is helpful to point out the critical features of the square. Point out also that things like size (noncritical features) do not matter. Labeling helps. The student will master the task more rapidly if he is at home with terms such as right angle, equal lengths, and so forth. If the labels are complex or tricky, there is often some advantage from a preliminary exercise providing experience in using the labels (Gagné procedure). Otherwise the labels can be dealt with incidentally after the main task has begun. It is better if the student talks rather freely, to himself or out loud, about the examples and their critical features. With such things as squares, moreover, it is wise to have students make tests for right angles and length of sides.

After coming to feel at home with the general notion of a square, the student should encounter some negative examples so that he can learn what a square is not. ("What can they know of England who only England know?") He must also learn, more precisely, which features make a difference (critical features) and which do not (noncritical). To accomplish this, he must get some experience with objects that vary in the noncritical features (size, degree of tilt) but which are still squares (positive examples). These should include squares of different sizes, and tilted to various angles. He must also get some experience with objects that have some of the critical features of squares, but which, lacking some feature, are not squares (rectangles, diamond-shapes). In mastering some concepts, moreover, he might have to deal with permissible variations in one of the critical features. Four leggedness, for instance, is a critical feature for the concept of dogs. These essential four legs also vary greatly in length, but the short-legged dachshund and the long-legged greyhound are both dogs. The concept of mammal demands the presence of mammary glands. But from species to species, these essential characteristics can vary tremendously in number, location, and esthetic appeal.

Whenever possible, the various examples, positive or negative, should all be present at the same time. This would not be feasible, of course, if you were using different short stories as examples of the concept of "justice," but it is clearly possible when dealing with concepts portrayed by geometric forms, pictures, or small objects. While these examples are present, continue to point out the distinctions between the critical and noncritical features, showing that for the concept of square, size and orientation are irrelevant, but other features are critical. In giving this advice, by the way, we are taking sides in the controversy on learning by discovery. The literature on concept formation, however, suggests that it is better to point these things out to the student than to leave him on his own. Clark (1971) reports seven or eight experiments that support this advice for every one that questions it.

From the conglomeration of figures the student should be required to decide which is a square and which is not. Aim at success. At first, obvious distinctions should predominate. At this stage, let him profit from incidental cues, such as the probable alternation between right and wrong answers. Reinforce each correct response. Better still, arrange things so that a correct response is reinforced in some impersonal way, as when the student is told to remove the "nonsquares" from a flannel board, and, as he does so, turns each item over and finds the correct label on the back.

With increase in mastery, present the student with more and more difficult choices and eliminate any extraneous helpful cues. If the concept is important—

and you may wonder if "squareness" rates all this attention—you may wish to arrange for exercises in which the square appears in more and more subtle fashion (Fig. 7.4). In teaching the concept of justice, for instance, you would progress from literary selections in which the concept was quite conspicuous and sharply differentiated from similar concepts (*Merchant of Venice*) to other selections in which some effort is needed to distinguish the concept of justice from concepts of sympathy, or goodwill.

At the outset, as we have said, you should avoid any variation in the noncritical features of the concept. Do not start off with squares of different sizes, or with some black on white and others white on black. To achieve final mastery, however, you must be sure that the concept is grasped no matter what noncritical features are present. The student must see squareness in windowpanes and in tile patterns. In pushing toward more adequate mastery, use many concrete examples chosen from a wide variety of settings. Justice as portrayed in one play could easily be confused with incidental qualities which appear in the same play. Use many literary selections or other examples. If you have to teach the concept of individual differences, for instance, use examples of individual differences in height, weight, hair density, and wealth. Never let the student feel or infer that individual differences refer only to differences in intelligence or any other single trait.

Use a multitude of practical examples in testing as well as in teaching. And provide much opportunity for testing. The mastery of abstract concepts depends, after all, on the student's own activity. You cannot do everything for him. After an initial guided approach, let him try himself out frequently with many different kinds of examples. Let him pick out the square face of the pyramid, the square pane of glass, the square in the pattern of some cloth. Let him beat out the rhythm in a song, in a poem, in rhythmic prose, or perhaps in a graphic pattern. Let him point out the rival claims of justice, mercy, and expediency in newspaper reports of trials, in fables, and in the problems before the United Nations. His *final* mastery of these concepts will come largely from his own trial-and-error efforts and from the reinforcement and insight which follow these efforts.

Comprehending and Using General Principles

In the Gagné hierarchy, the mastery and use of general principles or rules come close to the top, being surpassed only by problem solving. For Piaget, the formal use of abstract principles is the final achievement of the intellect. The process of teaching these important entities, however, presents little that is completely novel. True enough, the student will find success in this new task to be somewhat more elusive. Mistakes are easy to make. Undue anxiety, therefore, is all the more to be avoided.

How Much Guidance? As with the acquisition of concepts, the chief difference between the mastery of principles or rules, on the one hand, and the mastery of

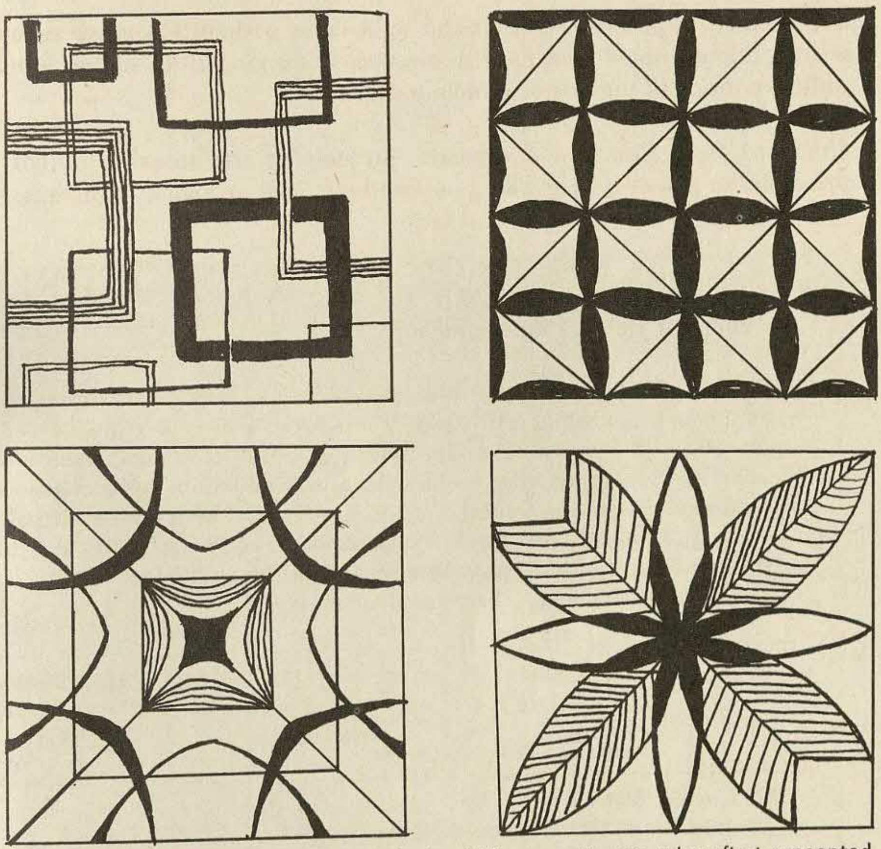

Figure 7.4. The concept (squareness) should be conspicuous when first presented.

isolated details, on the other, lies in the problem of guidance versus independent discovery. In teaching simple associations, we maneuver the student into an acceptable or reinforceable response at the earliest possible moment. By hook or by crook, success should come soon and should be clearly reinforced. In teaching the mastery of general principles, however, this hasty pressure toward success may not be in order. The ultimate grasp of a complex or subtle principle may be better if the student first endures a period of uncertainty or puzzlement (Smedslund, 1961). *Premature closure* may be a definite handicap. When a neatly closed structure, even if it is largely correct, comes too soon, it may make the student less sensitive to exceptions and nuances that really should be included in the more complete structure. In the second place, as we have pointed out earlier, this protective guidance may negate the attitude of inquiry that we hope to bring about.

In all this we face a dilemma. Too much guidance may jeopardize our basic aim. But a long period with no success might be equally dangerous. In the face of this problem it would seem wise to use the student's unguided effort so long as it seemed to promise some reassuring success without too much delay. Otherwise, guidance should be used as necessary, ranging from minor hints to outright exposition of the rule or principle itself.

Guidance from Concrete Particulars In helping the student to make use of principles or rules, as in working out mathematical or logical problems, the most

The Effect of Context on Reasoning

Eighty-one college students were given a test of syllogistic reasoning. The test contained a total of 240 items. There were four different kinds of materials, 60 items for each kind. The syllogism consisted of two statements (or premises) and three proposed conclusions. A conclusion was to be marked valid if it followed necessarily from the premises, even if it were false in actual fact. Conversely, a conclusion was to be marked as invalid if it did not follow necessarily from the premises, whatever its truth in actual fact. To get credit, all three conclusions had to be marked correctly.

Type (and Sample) of Items	*Mean Number of Items Completed Correctly Out of a Possible 60*
A. Familiar Material All the rugs sold in that shop are expensive. Some of my rugs are sold in that shop. (a) Some of my rugs are expensive (b) All expensive rugs are mine (c) Some of my rugs are not expensive	50
B. Symbolic Material All x's are y's. Some z's are x's. (a) Some z's are y's (b) All y's are z's (c) Some z's are not y's	43
C. Unfamiliar Material All tigerlini are coniferra. Some zoolidi are tigerlini. (a) Some zoolidi are coniferra (b) All coniferra are zoolidi (c) Some zoolidi are not coniferra	40
D. Material Familiar but Misleading All members of this club are undertakers. Some florists are members of this club. (a) Some florists are undertakers (b) All undertakers are florists (c) Some florists are not undertakers	46

SOURCE: Minna C. Wilkins, The effect of changed material on ability to do formal syllogistic reasoning, *Archives of Psychology* (New York, 1928), No. 102.

natural form of guidance comes from the use of context and concrete particulars. Whenever you think guidance is necessary, make sure that the rules deal with concrete entities familiar to the student. So long as guidance is in order, the *x*'s and *y*'s of algebra should stand for something concrete and familiar. The S's and *M*'s and *P*'s of the syllogism should be clothed with some familiar garb. Spend a moment on the following syllogism as expressed in abstract terms:

All S's are *M*
All *P*'s are *M*
∴all S's are *P*'s

True or false? How sure do you feel? Now try it in concrete form:

All (*S*)cotchmen are (*M*)en
All (*P*)ortuguese are (*M*)en
∴all (*S*)cotchmen are (*P*)ortuguese

What is your reaction? And how sure do you feel? Actually, there is probably no comparison in your reaction to the two problems. Any child who knows the meaning of the three terms can see that the last conclusion is fallacious. Many a college student, on the other hand, may fail to see that the first conclusion is invalid. To render a fallacy glaring and apparent, merely translate it into familiar and commonsense content. When this is done, a child of seven can detect the most complex logical fallacies.

Provided that you think your students are old enough to deal with formal operations, you will, of course, try to wean them away from this timid dependence on concrete context. By a gradual reduction of this guidance, you will hope to develop such competence in dealing with abstract symbols that they can proceed accurately even when the material has no relation to common sense, or when the assumptions are in direct contradiction to common sense.

Summary

Most material is easier to learn when presented in meaningful and structured fashion. A meaningful approach aids the mastery of isolated facts that must be learned and, more important, comprehensive meanings are often the chief goal of teaching. When we say that material is meaningful we could mean that it is familiar and rich in associations and imagery, that the items readily cluster into groups or categories, or that all the material fits into a single, coherent structure.

Patterns or structures are everywhere at hand and are to be had for the asking. We perceive the physical world in structured form, and our ideas always appear as part of some larger category or superordinate structure. There is much to be gained from stressing the relevant categories or organizers in advance. To be useful, these must be familiar to the student, and should be much more inclusive than the individual facts to be learned. Organizers introduced after some practice has taken place can be used to consolidate the facts learned.

Material to be learned not only fits into a larger structure but has an internal structure of its own. The essential structure should be made prominent and the details to be learned should fit into the dominating structure. The lesson may lack any important structure, or it may have a structure that is beyond the students. Some less basic structure should be stressed, or an artificial structure (mnemonic device) used to help master the details. Grouping, chunking, and coding are used as such devices. The items are separated into groups, the groups named, and the names memorized. As the name of a group is recalled, the group is decoded to produce the items within it. Memory experts make effective use of a continued story joining the items to be remembered and picturing these items as vivid images. Individual items are easier to learn when they are familiar and evoke powerful images. Rhymes and jingles are also used. The alphabet and our number system often provide a group of mnemonic pegs on which we can place items difficult to remember.

Meaning and insight enter into reinforcement. Even simple conditioning is more effective when the essential relations are understood. In some other kinds of learning the whole problem hinges on the grasp of a few single rules or relations (keeping the head down in golf). Often the main task is to find which feature of a complex act is responsible for success. Much of teaching is concerned with showing the relation between an act and its consequences. A child deficient in intellectual achievement responsibility blames others for consequences he himself has produced.

Meaningful relations not only help in mastering other material but serve as the great goals of education. In teaching these principles or understandings as ends in themselves we must be sure that the principle is valid. In learning larger principles it is important that the student should have the subordinate capabilities such as the basic concepts involved, and these in turn hinge on multiple discriminations, verbal associations, and more primitive capabilities. This Gagné hierarchy has proved useful in teaching complex tasks. A child who can now perform a complex task must already have the subordinate capabilities. When these are lacking they are taught by using the regular principles of learning—guidance, reinforcement, and so forth. The guidance necessary to grasp a principle can come from thoughtful displays or from the concrete context in which it appears. Appealing to concrete examples is always a useful check.

There is much controversy about guided learning versus discovery. Too much guidance negates the task of problem solving. If continued too long, it reduces efficiency. In the early stages of some kinds of learning, however, some guidance is better than none. The discovery approach leads to more effective transfer to new problems.

In learning a new concept (dog, squareness, equality, life), the child must be able to apply the same word to a number of objects that differ in many respects, and must avoid applying this term to some other objects. Naturally, the older child will have less difficulty. Children of any age will have more success with a conjunctive concept (dog), which must possess each and every one of several attributes, than with a disjunctive concept (uncle), which must have one attribute *or* another. Relatively concrete concepts (automobile) are easier to learn than abstract concepts (twice, half).

In all concept mastery the student must learn what to disregard (noncritical features). The task is easier if these are not too conspicuous and are easily distinguished from critical features. Anxiety or tension is a serious problem. Reinforcement should be prompt and generous. There should be little emphasis on speed. Many illustrations are needed, especially positive illustrations. Negative examples (things that could be confused with squares but are not squares) should be left until later. Noncritical features (size, color) should not be stressed at first. Both these and negative examples must be introduced later, however. Guidance is useful in this kind of learning.

The teaching of principles (e.g., the rules of logic) is similar to the teaching of concepts. There is much risk of error. Anxiety should be reduced, and there should be little emphasis on hasty solution. Here, however, there can be more emphasis on discovery. Some guidance is supplied by the concrete context. Additional guidance can be supplied as circumstances demand.

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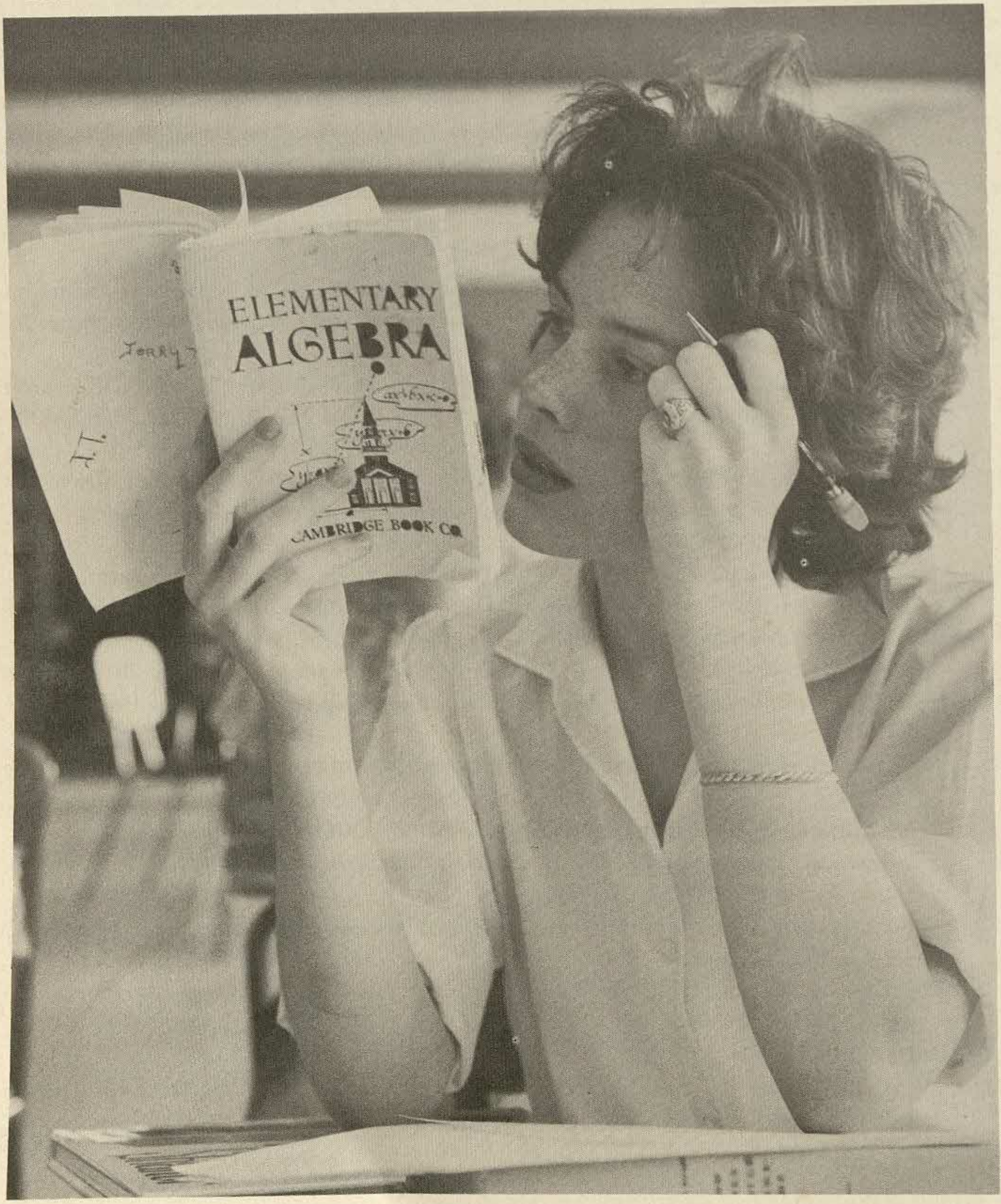

8

The Higher Uses of Intellect

It is important to help the student grasp the meaningful relations and established principles that have already been worked out and which lie ready and waiting for him to make his own. But this is not the whole of thinking. After he has come to understand the geometrical theorem that is presented to him in detail, the student must also be able to work out an "original" for which no solution is offered. In a sense, of course, this is a spurious original, since the student knows that a solution has been worked out and is merely being kept from him in almost teasing fashion. To progress further in the use of his thinking power, therefore, he should attempt genuine original problems for which there is no existing solution so far as he knows, or perhaps, so far as anyone knows.

Problem Solving

In Gagné's hierarchy, problem solving stands at the very top. But it still is a part of the hierarchy. When we set out to solve a problem we do not move into a completely different world. Many of the things we are required to do now are things that we have already been doing when we undertook to comprehend a theorem or principle that had already been worked out. Even when the theorem or principle is clearly in front of the student, and when he has merely to comprehend, he often goes about this task by the use of a trial-and-error, or problem-solving approach. Suppose you, yourself, encounter Sir Frederick Bartlett's (1958) definition of thinking: *Thinking is the extension of evidence in accord with that evidence so as to fill up the gaps in the evidence: and this is done by moving through a succession of interconnected steps which may be stated at the time, or left till later to be stated.* Do you merely say, "Ah! Yes," and immediately feel that you have a grasp of the process of thinking? Probably not. Spend some time trying to get the significance of Professor Bartlett's statement and you will probably find yourself guessing, trying out one idea after another, and applying the definition to a variety of concrete examples (Duncan, 1959).

The squirming around that you go through in trying to grasp or understand a new definition is found in much schoolwork. Observe a young pupil wrestling with the problem of 1 + 3. He repeats the problem to himself, hoping, with some justification, that the answer may just come to him. He guesses, and finds that this does not give the approved answer. He changes the question around, wisely as it happens, to the more familiar form of 3 + 1. If this fails he may resort to counting—a laborious and discredited device, but one that has brought success in the past.

Differences Between Comprehending and Problem Solving

Along with the things that are common to the two processes, there are some features that are much more prominent in problem solving than in the mastery of a principle that is already worked out. Take the matter of orientation. In trying to understand the definition of thinking, you had little doubt about where to direct your attention. You also had a fairly good idea about the first few steps to take. In solving a genuine problem, however, the whole crux of the matter may lie in this problem of orientation. If you are lost in the woods, for instance, the key decisions might be, "What do I look for? What do I do first? Of all the possibilities in this situation, on what do I concentrate my attention?"

The problem of orientation is not our only worry. In solving a complex problem we can expect very little reinforcement or guidance from our early efforts. When trying to get out of the woods, you may pick one "trial" path and go for a long time before you have the slightest hint as to whether you are finding your way out or whether you are actually getting deeper into the woods. In trying to understand things that have already been worked out, on the contrary, the reinforcement or guidance is more immediate and more definite. If your first guess is on the right track, you can usually see it, and can profit from this reinforcement. If the guess is getting you nowhere, you usually see that dismal fact fairly soon and are thus guided away from the unprofitable attack.

Finally, the teacher's part in the two processes is quite different. When you are trying to grasp the meaning of a definition, the teacher can readily take a very active part. He need feel no hesitation in offering all the help and guidance within his power. When you are trying to solve an original problem, on the other hand, the teacher must restrain himself. Even when he knows the correct approach, as in a textbook original, he must often stand by and let you fumble around on your own. The essence of the task lies in your independent discovery.

Strategies in Problem Solving

Consider the puzzle:

$$\begin{array}{r} \text{D O N A L D} \\ +\ \text{G E R A L D} \\ \hline \text{R O B E R T} \end{array} \qquad D = 5$$

You are to change the letters into numbers so that the addition will be correct.

Systematic Elimination Theoretically, you could try out all the possible arrangements. You could give *A* a value of 1, *B* of 2, *D* (known to be 5), *E* of 3, and so forth. If this did not work out, you could juggle the numbers around until you had hit on one that did work, or until you had tried out all the possible combinations. Of course, you would have to keep a record of which combinations you had already tried, and even with a systematic plan, this might prove laborious.

But the chief difficulty is the matter of time. With nine assignments still to be made (*D* being known), there is a total of 9!, or 362,880 possible combinations. Suppose it takes you twelve seconds to assign a new number to each letter, and to test out the results to see if they give the right answer. This would be working very fast, but even at that rate it would take you a month. Even if you double your speed, you would still have an impossible task.

Success in such a task does not come from speed but from the use of a more efficient strategy (Simon and Newell, 1971). By using such a strategy, many human beings can solve this problem in ten minutes or so.

Conservative Guessing and Making Use of Constraints Over the years, studies of problem solving (Bruner and others, 1956; Simon and Newell, 1971) have pointed to the value of conservative guessing. In playing the game "Twenty Questions," for instance, you could ask, "Did this man live in the Northern Hemisphere?" No matter what the answer you will learn very little but are bound to learn something. Either a "Yes" or a "No" answer will provide precisely the same amount of information. This is the ultimate in conservative guessing.

At the other extreme you could make a wild adventurous guess, asking, "Was this man Thomas Edison?" Here a "Yes" answer would give you a vast return, reducing your uncertainty to zero. A "No" answer, however, would tell you next to nothing.

To describe this matter in another way we can think of conservative guesses as being marked by many constraints. The possible answers are greatly limited, or constrained. When a question has been answered it is completely constrained. There is only one possibility. Short of the answer, we may have a situation, as with the hemispheres, in which we are limited to two possibilities. In the Donald-Gerald problem, D is answered and is thus completely constrained. Searching for other possibilities we quickly see that T is also completely constrained, permitting only an answer of 0. The knowledge gained about D and T enables us to detect additional constraints on other possibilities. If T is zero, there must be a 1 to combine with L + L to produce R ($2L + 1 = R$). R must be an odd number. It is not 5. Therefore it must be 1, 3, 7, or 9. R is thus greatly constrained. In looking for the most helpless (constrained) among the remaining victims, R might be worth considering. Actually, however, a further search shows us that E is even more constrained. When E is added to 0 we still have 0. Not many numbers will produce this result, so E is greatly constrained.

By concentrating on the victims that are most hemmed in, you increase your chance of initial success, greatly reduce the total array of possibilities (from 9! to 8! with one success), and in this situation *create* or bring to light other constraints that you can now use. See if you can use this principle as you finish cracking the Donald-Gerald code.

Some psychologists, Simon and Newell (1971) for instance, have been greatly influenced by computer processes in the development of their theories of problem solving. These theorists hold that in problem solving we can work on only one problem at a time. To combine the results of our probes we must depend either on some physical record, on a long-term organized memory, or on a transient short-term memory. Relatively speaking, it takes a long time to make a record, or organize a fact to long-term storage. For the rapid-fire steps needed in efficient problem solving we have to make great use of the short-term memory. But this memory can manage only simple tasks. Hence we need to concentrate on a series of small tasks, each of which lies within the powers of this short-term memory. When each of these small tasks is solved, the answer can be recorded for further utilization.

We must not imply, of course, that this computer-based analysis is completely accepted. It does link up, however, with the advantage most people obtain from focusing on possibilities subject to the most constraints. Most people, by the way, make some use of this conservative procedure, especially if they have recently made a venturesome guess and gained nothing.

Resonance and Risky Guessing Not everyone is willing to "constrain" himself enough to use the method of exploiting contraints. It calls for thoughtful control and, for some people, takes much of the fun out of problem solving. As it happens, moreover, many people have attained interesting and attractive solutions by relying on resonance, and in making a wild guess. Resonance may occur when you are looking for a particular part of a jigsaw puzzle and are merely letting your gaze wander over the various pieces until suddenly, for no clearly specified reason, one of the pieces becomes more vivid, or seems to stand out (Fig. 8.1).

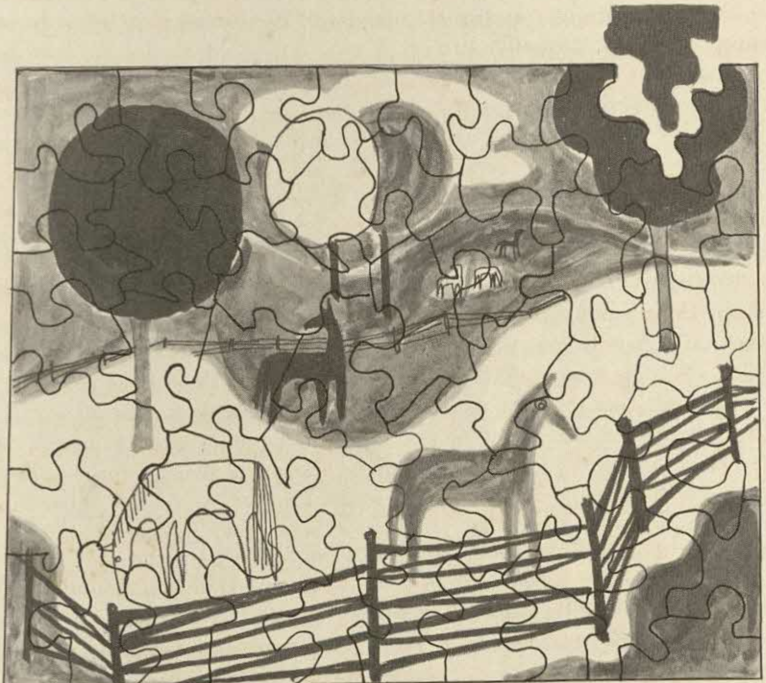

Figure 8.1. When the search model is clearly in mind, the needed solution may seem to call attention to itself.

In real life many problems have been solved by this seemingly mysterious, unconscious "resonance" (Ghiselin, 1952). A more complete analysis, of course, may show that this resonance comes from more prosaic features, but meanwhile we must acknowledge that to the people involved the solutions to many problems emerge in this way.

Encouraging the Use of Conservative Guessing It is true that few people ever ask which is the best strategy to use, or indeed, give any conscious attention to strategy. You may wish your students to become more sophisticated in these matters, however, and may wish to have them consider which is the wisest approach to use in the particular situation. To get a student to make a deliberate choice between strategies, you need merely ask him to tell you in advance just what his next move or next line of questioning is going to be (Ray, 1957). Few people, apparently, can announce a decision without giving some rationale

Getting the Student To Announce His Strategy

Air force trainees were given the job of finding out how to extinguish a light bulb by manipulating a panel of seven switches. The successful solution called for the simultaneous manipulation of two switches. Each man worked at the problem individually.

There were two sets of conditions, each involving 64 men. Under one condition (verbalizing group), each man was told that before he touched a switch he should tell the experimenter just what he was going to do. If the experimenter was not sure about the man's intentions, he asked, "Exactly which one?" or "And what would you do next?" The subject did not touch the switches until he finished his comments. These men took, on the average, 7.3 trials to solve the problem.

The men in the second (nonverbalizing) group were not required to talk about their plans before working the switches. They took 8.7 trials on the average. The difference is significant.

Speed of reaching the correct solution is not the whole story. We might also ask whether the men made use of a wise strategy in their efforts to discover the solution. At the outset no one would have any reason to suspect that two switches must be used. The most efficient strategy would be to explore the hypothesis that one particular switch would do the job. At the outset this simple hypothesis would be just as probable as any other. It would also be a useful solution, if it turned out to be correct. It would be easy to modify or build upon if it turned out to be wrong. Finally, it is the easiest hypothesis to test. One need merely try one switch after another.

In their talk, 63 percent of the verbalizing group showed that they were using this most efficient initial hypothesis. By the time they got around to working the switches, however, only 36 percent of this group actually used the most efficient strategy. Even so, they were ahead of the nonverbalizing group. Only 20 percent of these used the most efficient strategy. These differences are significant.

SOURCE: W. S. Ray, Verbal compared with manipulative solution of an apparatus-problem, *American Journal of Psychology*, 1957, **70**, 289–290.

along with it. Upon being asked what they propose to do, they seem impelled to consider reasons that are in line with the decision.

You can also hope to accomplish something by direct instruction. When children are shown the value of conservative guessing, or the use of constraints (Laughlin, Moss, and Miller, 1969), the older pupils (grades 5–7) are more likely to respond to the suggestion and to use this approach in their own attempts to solve problems. Children in grades 3–4 profit less from this teaching. Even without instruction, the older children were more likely to use conservative guessing, anyhow. But these older children were also more responsive to the teacher's efforts to produce this form of behavior.

Using Trials To Secure Information

Often, when experienced people are trying to solve problems, they use up a few trials, not in the hope of succeeding in those particular trials, but merely to obtain useful information. The gunner fires a few shots just to get the range. The expert bridge player leads a card, not primarily in the hope of winning that particular trick, but expecting to find out which of his opponents holds a crucial card. The army commander initiates a probe, not caring especially whether he captures this area or not, but chiefly concerned with learning about the strength of the enemy in that sector. Each one of our problem solvers, of course, would be grateful for a success if that should occur, but such a success would be a secondary bonus, and not the prime reason for the move.

Unlike the expert, you may find it difficult to adopt this cold-blooded, businesslike attitude toward your guesses. In extreme cases, you may stake your entire ego on each and every play. Each minor win is a triumph and a vindication of your judgment. Each loss is a crushing defeat and a humiliation that you may be unwilling to accept.

You will do much better in problem solving if you can regard each guess or move as a potential source of information and not as a test of your ultimate worth as a person. If your mind is dominated by the thought that you are right or that you are wrong, you may fail to notice all the information that your move has brought you. Extreme ego involvement is especially likely to prevent you from making efficient use of your wrong guesses. As the game "What's My Line?" progresses, for instance, you get a powerful hunch that this person is a member of a husband-and-wife theatrical team. You ask, "Are you related to someone who is prominent in the entertainment world?" The answer is "No." If you take this at its face value, you would abandon your hunch and move to a more profitable line of inquiry. Being so wrapped up in your theory, however, you refuse to give it up. Instead, you try to convince yourself that you are still right, but that your respondent misunderstood what you meant by "related to."

Reducing Ego Involvement in Problem Solving Anxiety or intense motivation is always a problem when there is much response competition and when errors are likely. And in problem solving, of course, errors are inevitable and are an essential part of the game. Even a moderate degree of anxiety will reduce the number of guesses that a student is willing to make (Klein, Frederiksen, and Evans, 1969). After some adaptation there is an increase in the number of

The Use of Successes and Failures in Problem Solving

In this game, each of two players chooses a 5-letter word containing no duplicate letters. Each tries to guess the other player's word, proceeding as follows: Suppose you have chosen the word "paint." Your opponent guesses any possible 5-letter word, say, "light." You reply, "Two," to show that "light" contains two letters that are also in the word he is trying to guess (paint). You don't tell him that these letters are *i* and *t*.

Sample of Guesses and Answers as Seen by One Contestant

Guess	*Answer*	*Feeling of Success or Failure?*	*Information Obtained and Possibilities or Hypotheses to be Considered*
"Float"	2	So-so	Any 2 of the 5 letters could be right.
"Rough"	0	Failure	*Much information.* Five letters can be crossed out. Useful constraints provided. Since *o* is out, two of the letters *f*, *l*, *a*, or *t* must be right.
"Tough" (Can you see any reason for using this guess?)	1	Coming back	More constraints. *t* is one letter. One of *f*, *l*, or *a* must be right.
"Flour"	0		*f* and *l* are out, so *a* is one of the letters.

(Reasons for trying "flour"; *o*, *u*, and *r* are out. If answer is 0, *f* and *l* are out and *a* is one letter. If answer is 1, either *f* or *l* must be right and *a* is out). The word is "beast."

guesses, though no improvement in the quality. To get students to feel less ego involvement in each and every move, you should try to avoid any show of impatience in yourself as you watch them floundering around. This may be easier to do if you have a record of the time taken by previous students to solve similar problems. You could then base your expectations on these records and not on your subjective feelings of how easy the task is. To help the student even more, you can remind him in advance that the process will take some time and will involve many guesses that will turn out to be wrong but which can be used to provide valuable information. In extreme cases, you may even encourage the student to pretend for a time that he is merely a spectator (Heidbreder, 1924). If he really could be a spectator, he would feel less emotion over the success or failure of each move and would be more aware of the information provided.

The General Problem of Wrong Guesses In any difficult problem we can expect a large number of wrong guesses. At times, but not always, these erroneous guesses contain information that the astute worker may notice and use to some extent at least. In some problems, such as getting at the meaning of a new concept, a few wrong guesses, or negative instances, are absolutely essential. It is difficult to learn what *democracy* really is unless we learn some of the things that it is not.

But for all their potential usefulness or importance, we should not go to any trouble to arrange for wrong guesses or erroneous trials. In the first place, there are bound to be plenty of them, anyway. In the second place, although they are useful or essential at times, there are other occasions when they contribute very little. They are likely to be useful when there are only a few possibilities to deal with. Your opponent has a five-letter word in mind, for instance, and you are trying to guess the word. You know it must contain one of the letters a, e, i, o, u, or y. Since there are only six possibilities, a few wrong guesses, five at the most, can solve this part of the problem for you. Wrong guesses are less useful when there are a great many possibilities of error. Imagine trying to give a person an idea of democracy merely by having him learn *all* the things that it is not!

Finally, it is the rare person who can make very efficient use of the valuable wrong guesses that do occur. Extreme ego involvement, as we have seen, may actually prevent us from realizing that our guess is in error. And even when we do admit that the guess is wrong, it is difficult to be strictly logical about the matter. Suppose you are looking for a misplaced key. You look in one drawer and convince yourself that it is not there. You make other guesses or trials and find that these are also wrong. Now, unless you are unusually methodical, you will find yourself going back to one of the places already eliminated. In this respect, our students are no better, and no worse, than their teachers. Over and over again we will find them making guesses or trying out solutions that, logically, they should have known were foredoomed to failure. Try to reduce this illogical behavior, but don't feel horrified when you see it. Regard it as further evidence that people seldom make the most efficient use of wrong guesses.

In general, since wrong guesses are sometimes useful, and occasionally essential, we should not be disturbed about those that are bound to occur. We cannot be sure, however, that any given group of errors will turn out to be useful, and for this reason we should not deliberately try to increase the number of wrong guesses or negative instances. We should, of course, give students more skill in extracting useful information from the guesses that do turn out to be wrong. This means more careful planning in formulating the guesses. It also means keeping ego involvement at a low level.

Sets and Their Management

Have a friend listen while you spell out m-a-c-m-a-h-o-n, then ask him how to pronounce the word. He should give you MacMahon. Continue with MacGill, MacDonald, asking for pronunciations. Now try m-a-c-h-i-n-e-r-y. You may get

Reducing the Worry About the Success of Each Trial

From earlier experiments of problem solving, the authors were convinced that in solving problems, people give most of their attention to the success or failure of each trial. So much attention is given to this feature, as a matter of fact, that important cues, hints, or regularities in the problem are never noticed. The authors reasoned that their subjects would do much better if they could be led to follow a systematic pattern of responses and thus be freed from having to make a new decision for each trial and from having to worry about the success or failure of that decision.

The task consisted of playing a "two-armed bandit." At a signal the student could press one of two keys, left or right. One of these keys would release a token, the other would not. On some trials the key on the right would be correct. On other trials it would be the key on the left.

The students were not told that any definite pattern of payoff would be used. To bring about a regular system of responses, however, the experimenters had one group working under a condition of simple alternation. If "left" was correct this time, "right" would be correct next time. After some 49 trials, on the average, the 20 members of this group came to follow this regular pattern. For a second group the left key was always the correct one, and this response was regularly used after an average of only 6 trials.[a] These two groups with definite response patterns were now given a purely random series in which it would be impossible to predict the correct sequence. A control group also took this random series. After the random series, the two definite-response-pattern groups and the control group encountered a patterned series of left-right payoffs. This, of course, was precisely the pattern that one group had adopted prior to the random trials, and this group mastered this final pattern in 8.0 trials. For the second group, however, this final pattern differed from the one originally developed. Nevertheless, the members of this group mastered the different pattern in only 9.5 trials. The controls, who had never been induced to adopt a regular pattern, required 17 trials. This was significantly greater than either of the other scores.

The experimenters conclude that a systematic pattern of responses prevents people from getting all disturbed about each and every response and enables them to concentrate on other aspects of the problem (looking for regularities or cues). This is true even when the systematic pattern used happens to be at odds with the one that must be mastered.

[a] A third group was used but the results are not included in this brief abstract.

SOURCE: Jacqueline J. Goodnow and T. F. Pettigrew, Some sources of difficulty in solving simple problems, *Journal of Experimental Psychology*, 1956, **51**, 385–392.

MacHinery instead of machinery. Such a response will come from the *set* you have developed by spelling out the "Mac" names.

Notice that the set proved to be both a help and a hindrance. The second and third names were easier to deal with because some set had developed. But the last problem was made more difficult. This dual role of set is typical. So long as the problems remain fairly constant, a very specific set may be most helpful. When the problem changes, such a set often gets in our way. Often the whole problem consists in avoiding or surmounting a natural set. Take the riddle:

> As I was going to St. Ives,
> I met a man with seven wives,
> And every wife had seven sacks
> And every sack had seven cats
> And every cat had seven kits.
> Kits, cats, sacks and wives,
> How many were going to St. Ives?

Here there would be no problem if the wording and the suggestion of complex arithmetic had not induced a misleading set.

Ideally, to be good at problem solving, a student should be able to acquire a set fairly easily and also be able to get rid of it quickly when it becomes a nuisance. Unfortunately these two things do not always go together. People who are good at acquiring a set are not necessarily good at breaking away from it. To be safe we should be prepared to help our students both in the acquisition and in the elimination of sets.

Creating a Set Perhaps the surest way to develop a set is to provide the student with a series of problems all of which are solved by the same approach. Pronouncing the "Mac" names is a simple illustration. Such direct experience is not the only means, however. In one classical problem a student is shown two strings hanging from the ceiling and is told to fasten them together (Fig. 8.2). They are so far apart, however, that he cannot reach both at the same time. An ordinary clamp happens to be lying nearby. The student has only to tie this to one of the strings and thus create a pendulum. By setting this pendulum in motion he can readily solve the problem. Many things could be done to give him a set toward this solution. If, before coming into the room, he had seen a string and clamp lying close together he would be more likely to use the clamp as a pendulum bob. Even if he had not seen the actual objects, but had merely learned to associate the words "clamp" and "string" he would be more likely to use the two objects together in the solution of the problem (Judson and others, 1956). The order in which events are presented can establish the set. A student reads "prayer, temple, cathedral, skyscraper," and is asked to eliminate the word that does not belong. He is likely to cross out "skyscraper." If the order had been "skyscraper, temple, cathedral, prayer," however, he would be more likely to

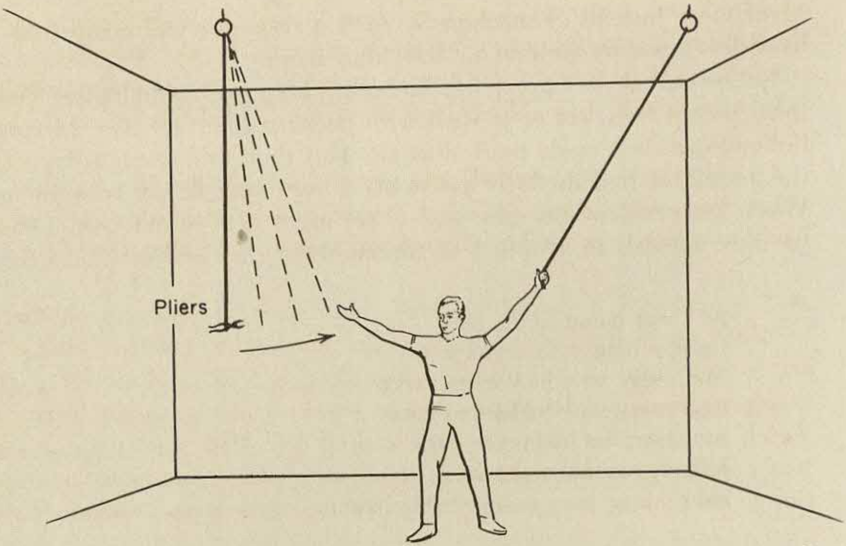

Figure 8.2. The problem of trying to join the two strings. Adapted by permission from S. A. Mednick, © 1964, Prentice-Hall, Inc.

eliminate "prayer" (Judson and Cofer, 1956). Here, of course, he would also be influenced by his basic interests or drives. A religious student would be less likely to eliminate "prayer" no matter what the order. Set, in other words, is also affected by basic attitudes.

All in all, it is fairly easy to establish a set. Sets are likely to develop even when the teacher has no intention that they should. A set will develop more quickly if you give many experiences and give them close together. If you want the set to carry over to a new experience, you should make sure that the practice sessions resemble the new experience. As you might expect, students will be more likely to develop a set if you urge them to hurry or tell them that they have only a few minutes left or otherwise subject them to stress (Duncan, 1959).

Obviously, if you wanted to avoid the development of a strong set, you would spread the practice sessions farther apart and would cut down on the speed or general stress. You might also introduce some variety into the practice. In the earlier example, for instance, you could spell out words like "machinery" early in the game.

Eliminating a Harmful Set When he has to use a clamp as a pendulum bob, the student is handicapped by a set arising from his general experience with clamps. This interfering set, technically called *functional fixedness* (Chown, 1959; Duncker, 1945), could be made worse, if, just before encountering the problem, the student has been required to use a clamp for its customary purpose. If you wanted to reduce this earlier set instead of strengthening it, you could ask the student to list all the uses to which a clamp might be put. In thus thinking of unorthodox uses, he might partially break away from a set toward a single use (Staats, 1957). On some occasions, a very general admonition such as, "Don't be blind!" has helped students avoid a harmful set which had just been built up.

To help the student get rid of a harmful set, we should, of course, avoid stress (Stevenson and Zigler, 1957) or any emphasis on speed. Such an emphasis is likely to reinstate an old set which is just about to be given up.

A Set to Break a Set It is true that much of problem solving consists in breaking away from a harmful set. But we might give the student a governing set to help him in this (Bloom and Broder, 1950). With some guidance, for instance, he might develop "a set to break a set," or might learn to be on the watch for the possibility of a misleading set. After considerable experience he may regularly say to himself, "Is there some other way of looking at this? What things am I taking for granted? Should some of these be questioned?"

Some Useful General Sets As part of the general set, we may try to get the student to adopt a general problem-solving attitude in which he tells himself that he can expect a period devoid of success, that the failures should not be regarded as evidence of stupidity, but should be used as possible sources of information, and that in spite of the initial failures, final success is to be expected.

It would be useful, by the way, if, as part of this general set, students could be induced to include more and more experiences under the head of problem solving. Matters which they often regard as evils to be borne in silence, or as items to be complained about, might better be considered as problems to be solved.

Individual Differences in Problem Solving

Those who are good at problem solving differ from those who are less successful in several ways (Harootunian and Tate, 1960). As we might expect, the people good at problem solving are more intelligent. But this is not the only factor. A group of people all having an IQ of 140, for instance, would exhibit a wide range of ability to solve problems. The boys would be somewhat better than the girls (Duncan, 1959, pp. 412–413). The more masculine minded of the girls would be better than the more feminine girls (Milton, 1957). Those good at problem solving would be no more fluent in giving out strings of words in general, but would do better in rapidly listing a large number of words having some special feature, words all beginning with "w," for instance, or words relating to oceans. The good problem solver would not necessarily be blessed with more information about the problem, but would be better in sorting out the relevant from the useless information. The successful students would probably

Sample Exercises in Problem Solving

WATER JAR PROBLEMS: These are like the problem faced by the man who needed 3 ounces of water but had no 3-ounce measure. He did have a 7-ounce measure and a 4-ounce measure, however. All he had to do was to fill the 7-ounce measure, and from this fill the 4-ounce measure. He would now have precisely 3 ounces left in the 7-ounce measure. Look at the first illustration. You have 3 jars with capacities of 4, 10, and 3 ounces respectively. You need 7 ounces. There are two ways to get this. First, fill up the 10 and pour off 3 $(10 - 3 = 7)$ or empty 4 ounces into the 10-ounce jar and then add the contents of the 3-ounce jar $(4 + 3 = 7)$. In the second illustration the solution is slightly more complicated.

Solve the remaining problems, indicating your solution at the right.

	Jars Available			*To Obtain*	*Steps in Solution*
	A	B	C		
Illustration (a)	4	10	3	7	$B - C$ $(10 - 3 = 7)$ or $A + B$ $(4 + 3 = 7)$
Illustration (b)	42	71	5	19	$B-A-C-C$ $(71-42-5-5=19)$
Problem 1	21	127	3	100	
2	14	163	25	99	
3	18	43	10	5	
4	20	59	4	31	
5	23	49	3	20	
6	15	39	3	18	
7	28	76	3	25	
8	17	43	3	20	
9	9	42	6	21	

TRIANGLES: You have 6 matches, each 3 inches in length. Arrange these to form 4 equilateral triangles each 3 inches to the side.

BUS STOPS: Try this on someone else. When the bus came to its first stop 8 people got on. At the next stop 6 people got on. Next, 4 people got on and 1 got off. At the next stop 5 got on and 3 got off. Then 6 got on and 4 got off. (Pause) How many stops did the bus make?

Turn to the end of the chapter for comments on these problems.

SOURCE: Adapted from Olga W. McNemar, An attempt to differentiate between individuals with high and low reasoning ability, *American Journal of Psychology*, 1955, 68, 20–36.

be no better in the rapid acquisition of a set, but would be better in breaking away from a set that proved to be a hindrance (Duncan, 1959; McNemar, 1955). In some cases those good at problem solving may be somewhat more negative, obstreperous, and less conforming or docile. This may be a factor in the superiority of boys over girls in problem solving.

The person who is successful in problem solving is more likely to restructure the problem. When the problem is stated in very general terms he is likely to translate these into concrete particulars. "Large corporations," for instance, would become "Sears, Roebuck." He rearranges tables of figures to give them more meaning or a clearer structure, and to get at the nub of the matter. Along with his more effective approaches and strategies, the good problem solver is also more confident and optimistic about the general possibility of solving problems, and about his own success in particular.

The Teaching of Problem Solving: Resumé

In setting out to teach problem solving we must not expect miracles. Some systematic attempts in this work have drawn blanks, and some others have had to be content with moderate success. A few, fortunately, have shown favorable results (Duncan, 1959, p. 401). In one elaborate experiment (Wardrop and others, 1969), at the grade five level, a series of programmed pamphlets led pupils to come up with more and better guesses. The effect was especially marked if the general classroom atmosphere did not already favor original thinking. Lundsteen (1970) also reported favorable results from training in problem solving given to grade five children. This hope of probable success makes the effort worthwhile. A very slight gain in the arts of discovery, even if experienced by only a few, would be worth the time, the effort (Rosenbloom, 1959), and the ingenuity demanded.

From the evidence presented, it would seem that students should increase their skill in solving problems if they could be led to make more conscious use of strategies; to plan their probes with a view to collecting information; to make use of the information that does become available from their efforts, especially from the efforts that fail; to try to keep ego involvement within reasonable bounds; to be on the lookout for misleading sets and for the chance to break a prevailing set.

Arranging for Early Success We can often do something to speed up the appearance of the first successful response. True enough, this is something we should not overdo. As is pointed out in Chapter 7, perhaps some uncertainty is necessary or helpful for the successful solution of a problem. Too prompt a solution may close the mind to a host of useful alternatives. But for many students this is not a serious problem. Typically we face little worry that our students will be too precipitous in coming up with a reinforceable response. For the most part our problem will be to get the pupil started on that series of successful performances from which an increase in skill may follow.

As in the mastery of general principles (Chapter 7), early success in problem solving is more likely when the student has already mastered the subordinate capabilities such as the capability of working out rules, or managing abstract concepts. Investigations (Scandura, 1966a, 1966b) suggest that practice in these subordinate skills will help out in specific kinds of problem solving, although the advantage may not spread to new kinds of problem solving. Lundsteen (1970) got mixed results. She concentrated on abstract thinking as the subordinate capability and found only a questionable advantage from training in this skill. For pupils with a low IQ, the most useful prerequisite was skill in the art of listening. The whole global attack used in this experiment, however, did produce favorable results.

Reasoning from general principles we would expect greater initial success in problem solving if we make sure, first of all, to use familiar materials (Fig. 8.3).

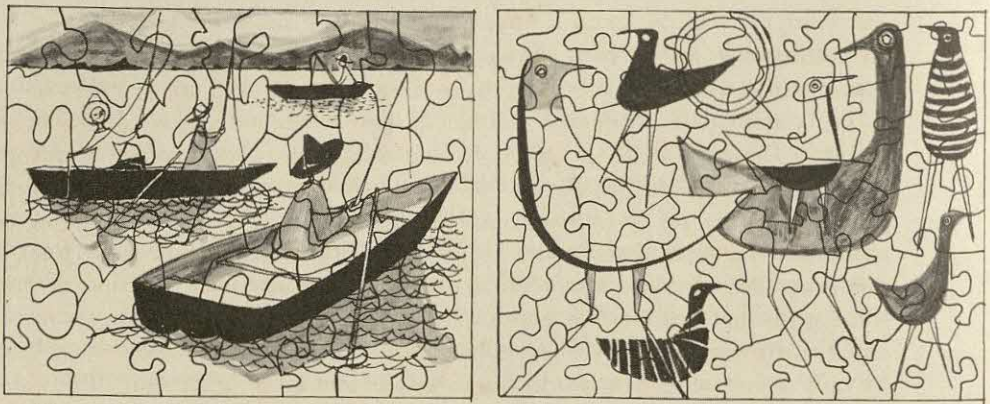

Figure 8.3. Familiar material makes the problem easier to solve.

Success would be more likely with a jigsaw presenting a familiar scene than one portraying a bizarre or strange design. The familiar material provides useful guidance and makes it easy for the student to know immediately whether a given move is right or wrong.

Typically, students are more likely to succeed in problems dealing with concrete materials than with highly abstract concepts (Duncan, 1959, p. 408). It is easier to figure out if this man's occupation is steam fitting or accounting than it is to discover if this particular x is in the class of x_1 that includes x_2. When dealing with concrete matters, we are often warned immediately when we begin to consider ridiculous possibilities.

Naturally it helps in problem solving if the central problem stands out clearly and does not have to be selected or separated from a mass of irrelevant or distracting items. At the start, too, a simple problem is to be preferred to one that is more complex or that asks the student to solve two or more problems at the same time (Anderson, 1957).

These aids, of course, are to be stressed when the student first encounters problems or attacks some new area. To continue such aids indefinitely would be to defeat many of our objectives in teaching problem solving. We hope that ultimately our student will be able to deal effectively with unfamiliar material, to isolate the nub of the problem from a mass of irrelevant material, to tackle complex problems, and to be at home with problems that are presented largely in abstract or symbolic form.

Critical Thinking

In different discussions, and even in formal tests, you will find that critical thinking means many different things (Penfold and Abou-Hatab, 1967; Ennis, 1962; Rust, 1960). At times it is used to include almost any thinking that the student does on his own or any careful use of logic (Dressel, 1955). In this section we will concentrate on one limited aspect of critical thinking, namely the tendency, or *set*, to adopt a cautious, questioning attitude. We have in mind the tendency to ask, "How do we know?" "What are the facts in this case?" "What are the reasons for coming to this conclusion?" These are the questions that the student will ask himself when he has acquired some skill in critical thinking (Smith, 1960). He is especially likely to ask such questions when he encounters important or significant claims (Henderson, 1958). This questioning, examining attitude is related to the intellectual operation of evaluation stressed by Guilford in his structure of the intellect (Chapter 3). Guilford points out that in this evaluation the student can use standards supplied by someone else, or he can work out his own standards. In either case he is examining the adequacy of an object, a symbol, an idea, a proof, or a general principle.

The willingness to seek relevant information can be fostered even in the elementary school. Allender (1970) had pupils in grades three through seven play the role of mayor of a city. As mayor, each child was confronted with a problem calling for a decision and was provided with an adult secretary (really an assistant to the experimenter), and was told of various kinds of information that the secretary could secure. He could ask for what he chose, could consult it as much as he chose, and could ask for more detailed information suggested by the materials he did consult. Many of the older children seemed interested to know the availability of the material and showed a tendency to ask for it and make use of it.

The development of a questioning, doubting attitude is a more delicate matter. To get a child to make extensive use of this we must overcome some built-in restraints, and we must also be sure not to go too far. The questioning, "How do you know" stance could clearly be overdone. Used on all occasions it would ruin spontaneity and congenial social relations. At best, we are likely to hurt the feelings of others by the expression of doubt that is implied in a request for evidence, or in an analysis of the logic by which a conclusion has been reached.

To get a student to make much use of critical thinking we must partially overcome this wholesome reluctance. To do this we might try to reassure him that critical thinking is called for only in a limited number of situations, but is most important in these cases. The fear of being surly or insolent can be reduced through the use of debates and mock trials in which the game calls for challenge and for an attack on the other fellow's logic. In real life, you can often find some simple method to reduce the emphasis on personal attack and to shift the attention to the objective problem to be solved. Instead of saying, in effect, "I want to see if *you* are a competent workman," you can properly say, and think, "I want to see if this product will meet my particular (peculiar) needs."

The Critical Scrutiny of Published Reports

Having persuaded our student, or ourselves, to look for facts to help him in his, or our, decisions, the next step is to examine these facts in critical fashion. This procedure, of course, varies from one area to another. The things to keep in mind in buying a house might be different from the considerations to remember in analyzing a political argument. To obtain an example that has wide applicability, we turn to the examination of published reports. Many of the facts that we search out will be based on such reports, and the intelligent use of this published information is most important for the teacher who hopes to keep in touch with his field.

An Example

A psychiatrist interviewed some three hundred children, all of whom were known to have some serious neurotic symptoms. He found that 35 percent of these neurotic children were addicted to horror stories in movies, television, or comics. Now, we may be tempted to conclude from this evidence that excessive exposure to such horror stories induces neuroticism in a fair number of children. This is plausible and in line with our general notions. But we would show a serious lack of critical thinking if we immediately reached such a conclusion on the basis of this evidence. There are a number of important questions that we should raise.

The secret of intelligent analysis lies in the way that we raise the relevant questions, or examine various possibilities. We should raise questions, or examine possibilities, that can be answered. At times, it is true, there may be some point in raising a question that cannot be answered, provided that the unavailability of an answer will have some bearing on our decision. Apart from this exception, however, there is little to be gained from raising questions for which there can be no answer.

Conducting a Businesslike Analysis In analyzing published reports one can go far, provided he has some knowledge of the subject and a keen eye for logical fallacies. Without these, moreover, he is not likely to achieve outstanding success. There are a few routine matters, however, which can be checked off by anyone willing to take the trouble. These will deal with some of the most frequent and serious pitfalls that beset the user of published research. The questions suggested here should help you to concentrate on the possibilities that really make a difference to the interpretation of the study. They should keep you from spending all your time on possible superficial flaws which make the study seem awkward or clumsy, but which do not detract from its dependability.

> 1. Do we have comparable figures for other groups which could be used as a reference?
>
> Perhaps 35 percent of all children, normal as well as neurotic, would show a similar addiction to horror stories. Do we have the figures to rule out this possibility? Unless the possibility is ruled out, there may be no apparent connection between neuroticism and the reading of horror stories. Suppose, however, that a reasonable control or comparison group has been used and that there is more reading of horror stories on the part of neurotic children. There is then some general, overall relation between these two things. We now ask:
>
> 2. Did the results come (a) from the use of ready-made groups (*ex post facto* approach; correlational approach), or (b) from the experimental approach (in which the investigator made arrangements to have different children read different amounts of horror stories?)
>
> 3. (To be used if the answer is (a) ready-made groups)
> Consider the following general possibilities or hypotheses:
> a. Horror stories contribute to neuroticism.
> b. Neuroticism increases the use of horror stories.
> c. Some third factor (e.g., unfortunate home conditions; physical defect) leads both to neuroticism and to greater dependence on horror stories. Is there anything (common sense, use of control groups, or statistical treatment) to rule out all but one of these hypotheses? If not, we cannot tell which of the remaining hypotheses is true.
>
> 4. (To be used if the answer to question 2 is (b) experimental approach)
> There are two general possibilities (hypotheses):
> a. The horror stories actually augmented the neuroticism.
> b. In arranging for different amounts of horror story reading, the investigator inadvertently also did something else which increased the neuroticism. Merely being told by an adult to read such stories, for instance (even if no stories were actually read), might upset some children.
>
> Has any precaution been taken to rule out the *b*-type hypotheses?

From the use of such a checklist you should be in a better position to decide whether the results point to one single conclusion or whether there are two or more rival or conflicting conclusions that could be drawn from the results.

Structuring the Remaining Uncertainty Whichever method was used, we face one of two possibilities. It may appear that there are no rival plausible hypotheses that challenge the most obvious hypothesis (horror stories contribute to neuroticism). We must then either accept this main hypothesis as the explanation or go without an explanation. We may, on the other hand, come up with some serious, plausible rival hypothesis. So long as this is so, you cannot, logically, accept either the most obvious hypothesis or any other hypothesis as having been proved. You are faced with uncertainty. This uncertainty is made up of the rival hypotheses or possibilities that still remain. The truth may reside in hypothesis *A*, or in *B*, or in *C*, or in any combination of these.

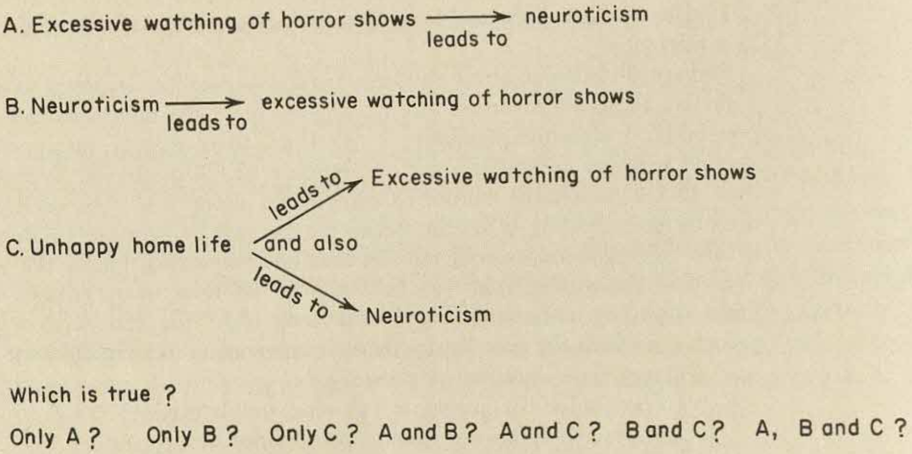

Figure 8.4. Rival hypotheses regarding what is causing what.

In many ways you are better off when you can express your uncertainty or doubt in the form of a cluster of rival hypotheses. In the first place, since there are several rival interpretations or hypotheses, it is clear that no single one of them has been proven to be true. Second, when you have a list of hypotheses, you know what to look for when you read or encounter further work on the question. Third, when you phrase your doubts in the form of definite, positive hypotheses, you will find it easier to decide just how plausible each is. Finally, a structured, organized uncertainty is just a more comfortable thing to live with than the vague infinite uncertainty of a simple "I don't know." We are still in the dark, but it is a better dark.

Classroom Success in Fostering Critical Thinking

For many years teachers have been urged to concentrate on critical thinking and to try to develop this skill in their pupils. In stressing this goal, however, we should not give the impression that critical thinking is just as easy to teach as anything else if we would only give it the necessary attention. As we pointed out earlier, success in this art would seem to come partly from the disposition to use it. And there are many pressures to persuade pupils not to go in for this activity to any great extent. This disposition, moreover, like the tendency to reflection as opposed to impulsivity, might well be built in to the constitution of the child.

Probing Behind the Most Obvious Conclusion

Below you are given a series of reported facts. Accept the facts for the time being. Note the most obvious conclusion. Consider this a trial hypothesis and see if you can find *other* or rival ways of accounting for the same facts.

1. 65 percent of one group of heroin addicts reported that they had begun with marijuana.
2. College graduates earn more than students who have never been to college.
3. 46 percent of male penitentiary prisoners had a record of being disciplinary problems in school.
4. Of 600 emotionally disturbed children from a rural area, some 40 percent reported in an interview that their fathers were seldom home in the evening.
5. The states in the Union were ranked according to the amount spent on the education of each child. In nationwide tests, the children from the states with highest expenditures made the highest scores.
6. 70 percent of a group of delinquent adolescent boys reported that their parents seldom showed them much affection.
7. Creative adults, to a greater extent than noncreative adults, report that during childhood their parents treated them as thoughtful, intelligent individuals.

Hints: (Read this section only after you have tried to work out some hypotheses on your own.)

Some of these examples fail to give comparable figures for any other group. Consequently we do not know for sure if there are any real differences to deal with.

Other studies do compare two or more groups and report that the groups which differ in one trait (x) also differ in another trait (y). All these studies took advantage of ready-made differences in x. If you are having trouble, start off with this gimmick: "There must be some reason for the differences in x (some young people go to college and others do not). Could these same reasons have a direct effect on y?"

Telling a child to be reflective rather than impulsive is not the same thing as telling him that water tends to expand when frozen rather than to contract.

Whatever the reason, the empirical studies have produced mixed results. Many decades ago, Lichtenstein's (1934) summary showed more failures than successes in the attempts to increase critical thinking. More recently, Wallen, Haubrich, and Reid (1963), working with grade eleven students, again showed mixed results—success according to one test, failure according to another. Hunkins (1968), using grade six pupils, found no greater gains in critical thinking from a program that stressed analysis and evaluation as compared to one that emphasized sheer knowledge.

In spite of the long record of limited success, it is perhaps too early to feel hopeless. Perhaps we could expect more from direct attacks in which a student can see important possibilities opened up as a result of intensive critical analyses. Often rival hypotheses call for quite different kinds of action. In looking at the sample studies given earlier, for instance, a student would be seriously misled and would be set for a questionable course of action if he embraced the first conclusion to suggest itself.

Creative Thinking

Creative thinking stresses the kind of thing that is observed in invention or in the production of works of art. Like problem solving and critical thinking, these activities call for independent efforts, and for the discovery of something new. In discussions of creative thinking, however, one additional controversial issue has been raised. Must there be some objective merit in this new thing that has been discovered or produced? Many writers have held that to justify the term "creative" the new thing must have some contact with objective reality. The discovery, for instance, should be "true"; the production should carry some conviction (Barron, 1969). Other writers hold that the new production or discovery is creative so long as it has meaning for the producer or discoverer. In problem solving, or in critical thinking, of course, there is no necessary emphasis on conformity to reality or to objective significance. The problem could be a trivial brainteaser. Critical thinking could be applied to some formal textbook problem.

In creative thinking there is also more stress on genuine novelty. The student solving a problem may know that a solution has already been worked out by someone else. In criticizing a logical argument he may be aware of a completed criticism reposing in the teacher's notebook. In writing a poem, or in painting a picture, or proposing a new constitution for the United Nations, however, the student does not feel that he is merely redoing something already accomplished. He must feel that the idea is new not only to him but to almost everyone. True, he may later find that the melody he has composed, or the device he has invented, was achieved long ago. But he is not aware of this while he is working on his project.

Characteristics of the Creative Person

Especially since World War II, creativity has been extensively studied. Some of the interest has come from Guilford's work (Chapter 3) stressing the hitherto neglected factors of divergent thinking and evaluation. Much of it also has come from a belated realization of the neglect accorded this valued human trait.

Theoretically, according to the Guilford structure of the intellect, many aspects of creativity could be quite independent of other aspects of intelligence. In practice, some degree of independence has been established (Dellas and Gaier, 1970; Barron, 1969; Wallach and Wing, 1969), but it is in no way complete. According to the summary presented by Dellas and Gaier (1970), the highly creative person may not get the top scores on a routine intelligence test, but he tends to be above average. Within this upper range of intelligence, however, there is only moderate correlation between creativity and other aspects of intelligence. The creative person is quick to think of the word or idea needed to complete a pattern. He is especially proficient, naturally enough, in producing novel or unusual ideas or associations. He has an exceptional memory for significant incidents in his own life, and he can see subtle and unusual relations between those incidents and other events. For the most part, it is easy for him to look at things, including his own experiences, from different points of view. He can readily try to describe himself, for instance, as his parents might see him, or as his wife, or boss, or worst enemy might regard him.

One of the traits that turns up again and again in the creative person is openness to experience and absence of defensiveness (Barron, 1969). The creative man is not afraid to look at an untidy or complex world. Indeed, his attention is attracted to the kind of complexity and disorder which clamors for a solution or for radical restructuring. He is especially intrigued by the kind of puzzling complexity that permits a highly individual or novel explanation. Creative artists, when asked to arrange a display which they will later have to portray in artistic fashion, may actually try to arrange things which will be difficult to incorporate into a picture, and which thus presents a challenge (Csikszentmihalyi and Getzels, 1970). True enough, the artist, in looking at this challenging and attractive confusion, may at the same time be vaguely aware of a possible way of dealing with it.

Although obsessed with the need for reducing esthetic or ideational chaos to order, the creative worker is relatively little disturbed by conventional moral irregularities. He is not much given to condemnation or moral judgment. Hearing that a man had secretly maintained three separate households, for instance, he would be only slightly interested in the moral issues but greatly intrigued by the complex practical problems involved, and the varied human reactions to these problems and possibilities.

The creative person is especially open to his own feelings and ideas. More than most people, he looks unfearfully at his own unorthodox urges and concepts. He faces his own confusion and fears. Often he will announce these things to other people in unashamed and matter-of-fact fashion. To an unusual extent, many creative men will freely admit a feminine side to their nature. The noncreative male would often refuse to recognize these things in himself and would certainly hesitate to announce them to others.

The openness of creative people may have given them an unjustified reputation for neuroticism. They may have no greater share of offbeat feelings or weird concepts, but may merely be more free in admitting the peculiar notions they do have. People who *rate themselves* high on actual creative production tend to be somewhat more neurotic than those who consider themselves less productive (Taft and Gilchrist, 1970), but this does not apply to those actually going in for creative work. The creative people who have been carefully studied show little evidence of actual insanity. Psychic turbulence may be more marked in the creative, however, and is certainly less likely to be hidden away when it does occur. On the average, the gifted artist or creative worker has a better integrated ego than his less creative fellow. He has a clear picture of many of his goals, and of himself in relation to those goals. Often he has a fairly clear view of the price he must pay to attain his goals.

Careful studies confirm the widespread impression that the creative worker is an individualist. He has a tremendous urge to work things out in his own way, and is not especially concerned with the impression he makes on others. He concentrates on his own creations more than on the needs of others, and at times may seem to exploit those around him. This impression is enhanced by a frequently detached attitude toward others and by a greater concern for ideas or creative products than for individuals. Convinced of the importance of his own work, and often confident of the correctness of his own insight, he is prepared to proceed boldly without too much worry about past or future failure. This faith and this realistic attitude toward failure enable him to persevere under circumstances that would completely discourage many people.

Typical Stages in Creative Thinking

There are a few typical stages which are reported over and over again by those known for their creative achievements (Ghiselin, 1952; Patrick, 1935). One of these stages is a period of *incubation*. When he first begins to work on a problem the creative worker does a great deal of analysis, makes sure that he has a clear grasp of what he wants to do, and makes sure that he understands the minor problems that need attention. Then he tries to put the whole matter into the back of his mind to allow it to incubate. At this stage he gives it occasional consideration but little systematic thought.

With luck, the period of incubation is often followed by a fairly sudden *illumination*. A solution appears, often out of the blue, often in the midst of some other activity (Archimedes in his bath). We say that *a* solution appears. Unfortunately this does not always turn out to be *the* solution. After some *evaluation* the author decides that this ending to the story will not work. The inventor finds that the gadget he visualized has some bugs in it. When this happens he must revise the solution or perhaps reject it completely and start over again.

Perseverance

Although the experience of illumination is exciting and encouraging, the other two stages call for unusual determination and persistence. Prior to the illumination there is the familiar problem of lack of reinforcement. The creative worker can see no apparent progress that might reward and sustain him. Confronted by such an apparent standstill, most people will give up. It takes tremendous determination to continue. Even more determination is demanded when the creative worker must ultimately discard the "solution" that seemed so promising when first conceived and must face another stretch of unrewarding incubation with the risk of a second false illumination.

To persevere in the face of an obstacle does not mean to concentrate our attention unremittingly on that single obstacle. Many poets, baffled by an awkward phrasing, will go on to other lines, leaving the awkward problem until later. An artist may skip over the part of his picture that presents problems and go on to the rest of the composition, coming back later to the section that gives trouble.

General Set Toward Originality

Many people already show a set toward originality or modification. Some people find it difficult to copy a sentence in its original form even when it is important that they do so and when they intend to do so. Many people cannot be content with a furniture arrangement they have inherited. Along with this spontaneous set to improvise and modify, there is a general climate in our society which puts a high value on self-expression, originality, or do-it-yourself. Not only do we value the creativity that leads to discoveries and inventions that are genuinely new and useful, but we also value self-expression for its own sake, even if the thing "created" has less merit than something already available, or is merely an inferior copy of something readily available. These widespread pressures from within and without should help us develop in students a set toward originality or creativity. It should not be difficult to show how society benefits from performances that are genuinely creative. It should also be easy to show the personal satisfaction to be obtained from the self-expression involved.

In all this we might try to maintain the distinction between acts that are genuinely creative and those which merely involve the satisfaction of self-expression. In creative efforts the phase of evaluation must never be neglected. After our "brainchild" has arrived, bringing the delightful sense of achievement, we must, if we are to be creative, coldly ask if this really differs in any important and useful way from that which is already available. In mere self-expression, on the other hand, we face no such obligation. Along with Touchstone, we can properly say, "A poor thing, but mine own." We can realize that our production is really a somewhat inferior substitute for something already produced, but we

How Much Do Teachers Emphasize Divergent Thinking?

Taped records of a 40-minute lesson were obtained for 117 first grade teachers. Of these, 42 were enrolled in an experimental program designed to help the teachers work more effectively with disadvantaged children. Six assistants studied the tapes and noted each question asked by the teacher. The questions were classified according to the kind of intellectual operation involved (see Chapter 3 for Guilford's description of these operations).

	Percentage of Questions Calling for Each Operation		
Intellectual Operations (From Guilford, see Chapter 3)	*Teachers in the Experimental Program*	*Teachers Not in the Experimental Program*	*Difference Significant?*
Perception (Shape of your name tag)	7.6	4.3	Yes
Cognition (What kind of pictures are these?)	26.7	37.2	Yes
Memory (Where have you seen them before?)	5.9	10.4	Yes
Divergent Thinking (What other ways could we place these?)	1.1	1.0	No
Convergent Thinking (Is it possible to make this into a square?)	16.1	14.2	No
Evaluation (Which picture is better?)	3.0	3.8	No
Not classifiable	39.5	29.1	Yes

SOURCE: Barry J. Zimmerman and John R. Bergan, Intellectual operations in teacher question asking behavior, *Merrill Palmer Quarterly*, 1971, **17**(1), 19–26.

can still enjoy the fun of producing it. The thing we must not do is to regard it as genuinely superior just because we produced it.

Although the general culture provides strong support for creative activities, we must not shut our eyes to the fact that some schools, and some teachers, are far from enthusiastic about the child who is strikingly creative (Torrance, 1961a). Such children, with their individualistic notions and their fondness for an unconventional slant (MacKinnon, 1962), may readily worry the teacher whose chief responsibility is the development of traditional, conventional subject matter. If you yourself became firmly convinced that, within reason, you must foster creativity, you may even find that the conventional teacher within you will occasionally take a dim view of the creative outbursts of your students. In your efforts to cultivate creativity you will find much support in the general atmosphere and in the child's inner nature. But do not expect to find similar support regularly in your colleagues or even, on all occasions, in your work-weary self.

Developing Specific Abilities

As a result of their own urges and of the pressures applied to them, many students will be eager to do something original. We can best help them in this ambition by working on a few specific abilities known to play a part in creative work (Parnes and Meadow, 1960; Torrance, 1961b; Wilson, 1958).

Practice in Detecting Problems People vary in their sensitivity to problems. How many important problems in your own field—education—can you list? Some people could quickly fill several pages with such problems. Others could think of only one or two. Similarly, we vary, one from the other, in our awareness of esthetic problems, or problems in design (the fact that this piece of furniture does not fit in); or intellectual problems (why do people have an urge toward originality?); or practical problems (a possible widespread shortage of water). Since awareness of a problem, of a gap, or of an inconsistency is often the first step toward creativity, you will want to help students see or detect such problems. To provide this help, you could give the students practice in answering such questions as, "What problems would arise if the ocean rose two feet? if you had to build a theater to use odors as well as sound and sight? if all insects were suddenly exterminated?" For each example, the students should try to list as many problems as possible.

Encouraging Ideational Fluency Your students are more likely to come up with one original idea if they can think of many different ideas. The more ideas they can get down on paper, the larger the pool of ideas from which they can later select one that may be original. You might give students practice in such things by asking them to list all the different uses they can think of for a brick; all the different uses for a pair of pliers; all the different natural foods they can think of that might be found in a meadow; all the different things that might be done to reduce traffic congestion in cities; all the different things they would like to create. Use your own ideational fluency to extend this list. Before reading any further, jot down a few additional problems. In your actual teaching, of course, you will also consult lists that have been thought up by other people.

Special Training in Creativity for Bright Children

A special group of 17 children in grades 5 and 6 were given 8 months of training in creative work. These children all had IQs of 130 or above and had done well in school. They responded well to challenge. The children were given questions calling for divergent and evaluating thinking (see Chapter 3), and were also asked to devise questions on their own dealing with these abilities. The teacher planned other activities calling for divergent thinking.

	Average Scores		
Tests of Creativity:	*Before Training*	*After Training*	*Difference Significant?*
Finding unusual uses for a simple object (cardboard box)			
Number of items	13.4	10.6	No
Variety of items	8.6	8.6	No
Suggesting ways of improving a simple object (toy elephant)			
Number of items	9.6	6.9	Yes
Variety of items	5.4	5.6	No
Consequences of changes (What would happen if clouds had strings attached?)			
Number of items	4.8	5.3	Yes
Variety of items	3.6	4.6	Yes

Notice that some of the scores decreased. With only 17 students differences are less likely to be significant.

SOURCE: Louise M. Bachtold and Emmy E. Werner, An evaluation of teaching creative skills to gifted students in grades 5 and 6, *Journal of Educational Research*, 1970, 63(6), 253–256.

Practice in Thinking of Novel Items Look over the ideas for problems that you have just written down. Unless you are unusually endowed with the spontaneous urge to be different, you will find that the ideas that you first produced bear a strong resemblance to the illustrations that were provided for you. Ordinarily you will not come up with highly original ideas until the trite and ordinary ideas have been eliminated (Maltzman, 1960). Unique ideas, when they appear, are likely to turn up after a series of commonplace associations (Ward, 1969). To many theorists, this is the crucial point in the production of novel ideas. Keep people giving out one idea after another until they have used up all the customary, frequent notions. Then, and only then, will they start to produce ideas that have some claim to novelty. To speed up this process, you could deliberately rule out, or *preempt*, the familiar or traditional ideas that people ordinarily think of first. Give the students a cartoon along with several ordinary, trite titles and ask them to supply additional titles.

The general atmosphere produced by the teacher can have an effect. By giving young children some preliminary experience in free and easy planning shared by pupil and teacher, we can increase the number of novel solutions proposed in a subsequent exercise. When the preliminary experience is rather rigidly controlled by the teacher, on the other hand, the number of original, divergent ideas falls off but the number of correct formal solutions increases (Crabtree, 1967; Torrance, 1963).

Initial Guidance What about the use of hints or guides to elicit original responses? From one experiment on ideas for improving doorknobs (Warren and Davis, 1969), there seems to be some support for the use of minimal guides. Students were helped by a brief list of general things to consider (variations in shape, color; rearranging parts.) They were also helped by a structured diagram in which ideas for improving one feature (ease of installation) were listed along one axis, and ideas for another feature (more positive control) were listed on the other axis. The student still had to combine these ideas to make a specific suggestion. A more detailed (73 items) checklist proved less useful.

Practice in Improvising Improvising often involves the breaking of a set. You can give practice in this by presenting problems such as the following: how to open a can without a can opener; how to draw a right angle without a square or protractor; how to move in a zero-gravity situation, the atmosphere offering no resistance (answer: sneeze, or take a penny from your pocket and throw it).

Mastery of Traditional Material: Pros and Cons

A student embarking on creative work may readily rebel when required to master the classical work in the field. After all, the overpowering need is to be original, and now the teacher is chiefly concerned with having him digest and remember what has already been done! But genuine, objective originality is an informed originality. It consciously pushes beyond what is already known. The great innovators, by and large, have been masters of the traditional material from which they departed.

There are several ways in which a creative worker can profit from a knowledge of what is already known. Unless he knows what is already available he cannot know what is really new. Only by knowing older forms, moreover, can he hope to combine those older forms in a new pattern. A knowledge of the

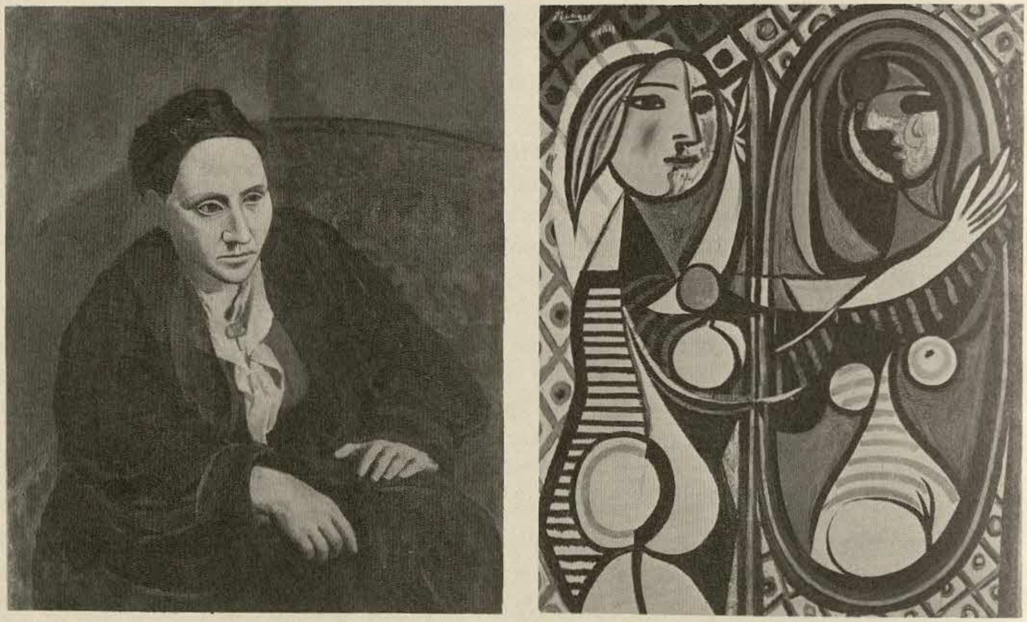

Figure 8.5. The innovator is often a master of the traditional. *Left:* Portrait of Gertrude Stein, Pablo Picasso, 1906. The Metropolitan Museum of Art, New York. Bequest of Gertrude Stein, 1946. *Right:* Girl Before a Mirror, Pablo Picasso, 1932. Collection of The Museum of Modern Art, New York. Gift of Mrs. Simon Guggenheim.

traditional material might also help in the important process of eliminating the trite and ordinary responses. As we have seen, we are unlikely to think of something new until we have exhausted the usual and most familiar ideas. Perhaps those people who are steeped in existing concepts have already, in some vicarious way, eliminated most of the ordinary and familiar items from the pool of their associations. Even when there are some trite ideas left in the pool, it should be easier for the sophisticated person to get rid of these in one or two well-organized packages. He can then quickly get on with the uphill job of producing less familiar items.

Obviously familiarity can be overdone. By spending too much time with the traditional forms and solutions, we could develop a series of sets from which it would be hard to break away.

Providing General Support for Originality

In most school activities the student is asked for customary, orthodox reactions and for answers that can easily be obtained from textbook or lesson. In urging him toward creative work, however, we are asking him to think up and announce suggestions that are unorthodox, unusual, and elusive. It would be natural if he should need a great deal of support in this unfamiliar activity (Buzzeli and

Background Factors in Creativity

A measure of creativity was administered to 68 middle- and lower-class white children from day-care and nursery-kindergarten settings. The test consisted of a game requiring the children to utilize their imagination in finding names for a series of ambiguous toylike objects.

	Number of Children		*Mean Scores in Creativity Test*		
	Middle-class	*Lower-class*	*Middle-class*	*Lower-class*	*Difference Significant?*
Boys	18	16	23.4	17.3	Yes
Girls	18	16	22.7	18.1	No
Both sexes	36	32	23.1	17.7	Yes
Oldest (or only) child	18	12	24.3	19.8	No
Later-born children	18	20	21.9	16.4	Yes

SOURCE: J. S. Lichtenwalner and J. W. Maxwell, The relationship of birth order and socioeconomic status to the creativity of preschool children, *Child Development*, 1969, **40**, 1241–1247.

others, 1959). To provide this support, first of all, help the student to realize that he as a person is not on trial. His acceptance as a person is assured no matter what he says. Second, make sure he understands that, in this activity, individuality and individual differences are valued. The pressure toward conformity should be eliminated as far as possible. Third, in contrast to the usual situation, criticism should be ruled out during the actual production of ideas or suggestions. One of the benefits from training in originality seems to come from this matter of making a student less critical of the ideas that may timidly suggest themselves (Klein, Frederiksen, and Evans, 1969). Following the same general idea, Samuel Johnson, many years ago, advised authors to "Compose in fury, and correct in phlegm." Get the words down while almost anything you write seems good. For some writers the attraction of alcohol lies in its power to lull the critical tendencies. Under these conditions, many ideas otherwise destined to die at birth may at least be given a hearing.

After ideas have been safely committed to paper or otherwise recorded, it is necessary, of course, to turn on the critical facilities and correct in cold blood. Now, every idea must pass severe scrutiny before it can be preserved.

A group version of this procedure is seen in the process of brainstorming

(Parnes and Meadow, 1959). A problem is presented. Suggestions are invited. The call is for as many suggestions as possible, and for as many novel or original suggestions as possible. The more offbeat the better. During this phase, no one is permitted to offer an objection or even to make a questioning grimace. Everything is enthusiastically accepted. You are encouraged to elaborate on your neighbor's weird idea, to extend it, to build it up, but you must never restrict it or tone it down. Here the elimination of the trite and familiar is speeded up by group action. Novel ideas thus appear sooner, and these are written down or otherwise captured. When this is safely accomplished the grim business of evaluation begins. Even here, however, the process should be as impersonal as possible. The person whose idea is finally rejected should not feel inhibited on the next occasion. This danger is less serious, of course, if the brainstorming period has been successful in producing a number of fantastic ideas. In that case, everyone will see most of his ideas rejected in the evaluation session, and nobody should feel conspicuous just because some of his ideas failed to pass the test.

There is some evidence that teachers can use these brainstorming techniques (De Roche, 1968) or similar techniques (Olton and Crutchfield, 1969) to bring about more flexible and original responses on the part of bright children. The effect is less marked for students of below average ability (De Roche, 1968). When the teacher is strongly motivated to try the new procedures, student participation is more marked. Students make more comments of many types. Some of these additional comments are of a divergent nature. Others are convergent (Trowbridge, 1969). The net result, of course, is a higher score in creative output. In general, the creative emphasis seems to result in no loss for general academic achievement (Rusch, Denny, and Ives, 1967). There are some disappointments. After noting both successes and failures in earlier experiments, Bachtold and Werner (1970) carried on an 8-month experimental program for bright pupils in grades five and six. They found that their procedures did bring about greater flexibility in evaluative thinking as described by Guilford. There were no gains, however, in Guilford's divergent thinking, although this is the area most clearly related to originality and creativity.

From common sense, we would expect that the general classroom atmosphere would have an important effect. However much can be done, or cannot be done, to boost creative performance, we would expect creative activity to be inhibited if the teacher is horrified by ill-formed guesses or if he is annoyed by offbeat suggestions. This might dry up the flood of uncensored, prelogical ideas on which creative art partially depends (Sears and Hilgard, 1964; Spaulding, 1964).

Summary

Although similar to ordinary learning in many ways, problem solving involves difficulties in orientation, permits little reinforcement in early trials, and requires the teacher to keep guidance to a minimum. Theoretically, a problem could be solved by systematically eliminating each possibility, but typically this is too unwieldy.

In conservative focusing, the student concentrates on the aspect of the problem which is most constrained. In solving this he imposes more constraints or limitations on some other aspect of the problem. Many students find this strategy irksome, and prefer to rely on resonance or venturesome guessing in which a failure yields nothing. One of the secrets of problem solving is to use information that wrong guesses can be made to yield. Such a logical strategy is more likely to be used when students are not overly anxious.

Sets play a crucial part in problem solving. At times success hinges on the rapid acquisition of a set. More often, however, the crucial point is the breaking of a prevailing set. A set can be brought about by word association or cues within the situation. At times it may be also broken by hints or by general policy of looking at a variety of possibilities. Ability to solve problems is clearly related to this ability to break a set. It is also linked to ideational fluency, divergent thinking, negativism, confidence, and a disposition to reorganize problems into meaningful patterns.

Attempts to teach the art of problem solving have met with both success and failure. The use of an efficient strategy can be taught to some extent. Early success in problem solving is facilitated when students have the subordinate capabilities and when the illustrations contain familiar and concrete material.

Critical thinking means many different things, with stress on the process of questioning, asking for evidence, and using logical analysis. This process, often uncongenial, has its place in such tasks as that of deciding what we can conclude from a published report. Questions that come to us should be checked to see if they permit an answer, and if this answer would affect our decision. To be most useful, questions or worries should be translated into specific hypotheses or "suspicions" that can be checked. Routine hypotheses deal with adequate reference groups and the possibility of unstated alternate causal patterns, including reversed causality, a common cause, and inadvertent differences introduced in experiments. We should arrive at a pattern of rival possibilities representing the choices open to us. Schools have had off-and-on success in teaching the art of critical thinking.

Creative thinking goes beyond ordinary problem solving in that it refers to a solution that has not yet been achieved. Creative work typically involves periods of incubation, illumination, evaluation, and, so very frequently, a repetition of the whole series when the evaluation reveals a flaw. This means tremendous but flexible perseverance.

The highly creative person has better-than-average intelligence, but is not necessarily at the top of the scale. Within this upper range, creativity and cognitive intelligence are largely independent. Divergent thinking should predominate. The creative person is intrigued by the unique or unusual that may repel others, and looks openly at the unorthodox aspects of his own nature. He needs autonomy and may be ruthless in pursuing his own goals.

In promoting creativity we can rely on a prevailing set toward originality in

Comments on Problems and Exercises

Sample Exercises in Problem Solving, page 264.

WATER JAR TEST: Go over your solutions to problems 5–9. For problems 5 and 6 you could use either the solution you had been using $B - A - 2C$, or a simpler solution, $A - C$ for 5, or $A + C$ for 6. Did you notice the simpler solution when you first tried these two problems? if not, why not? After you tried Number 7, did you go back over previous solutions? How many solutions did you discover for 8? for 9?

TRIANGLES: The problem in this puzzle hinges on your set to use all the matches in the same plane. To solve the problem you must form the six matches into a pyramid, using one triangle as the base.

Probing Behind the Most Obvious Conclusion, page 271.

(Rival hypotheses or possibilities that challenge the obvious conclusion)

1. Perhaps 65 percent of nonaddicts from this group had also used marijuana. The same kind of personality that leads to marijuana use also leads to heroin. The circumstances that promote marijuana use also promote heroin use.
2. The same ability (or family support, or ambition) that is responsible for college attendance will also produce higher earnings.
3. Perhaps 46 percent of *all* males in this age group would have had discipline problems.
4. Perhaps 40 percent of *all* rural children would *report* frequent absence of fathers. The emotional disturbance of the child may have influenced the father to go out for the evening. Other distressing conditions in the home could have led to both father absence and child disturbance.
5. The wealthy states spend more. They also have other advantages (more stimulating homes, libraries, etc.) that could produce the superiority.
6. Perhaps 70 percent of *all* adolescent boys would make the same report. The delinquent's exaggerated notion of what is due him might brand ordinary affection as meager. Delinquent behavior may lead to parental annoyance. The same factors (unfortunate home life, irresponsibility on the part of parents) that reduce affection could also cause delinquency.
7. It is the able, creative child who is treated in thoughtful, intelligent fashion. The parents who treat people this way could, genetically, pass along unusual ability.

the world at large, but we cannot assume that all teachers will relish creativity in their students. We can give help in detecting new and elusive problems, in thinking up many diverse and novel modifications of traditional ideas, and in improvising resourceful solutions. To some extent novel creations may come from the exhaustion of the trite, and here a study of traditional material should help.

When first producing the awkward brainchild, the student should be encouraged to keep his critical tendencies in abeyance. Brainstorming has been used to accomplish this. Later, of course, the new creation must be exposed to the most ruthless evaluation.

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Suzanne Szasz

9

Effectiveness in Learning

In the previous chapters we have examined the basic processes by which knowledge and skill can be developed. But we must deal with a vast number of facets of knowledge and skill. Now we must ask how we can teach all these facets without wasting too much time, without placing unnecessary strain on ourselves or on our students, and without letting the many things we must teach interfere too much with each other. In these matters we are concerned with the problem of efficiency in learning. We also want to be sure that when the skill or knowledge is developed it will turn out to be useful in the future and in as many circumstances as possible. Obviously, a student's skill or knowledge can be used in future situations only to the extent that such skill or knowledge stays with him. We must, therefore, try to promote this necessary retention and to reduce the all too prevalent forgetting.

Facilitation and Interference in Learning

In some jobs we might undertake, the separate minor tasks have little effect on each other. We can drive one stake or picket of a picket fence, for instance, and then go on to the next with little fear that what we do to the one will have much effect on the other. Laying bricks is somewhat the same, but here there is a chance that the bricks just being laid might disturb the earlier work, or, in some cases, provide additional support for the work already done. In other jobs, on the contrary, it is almost impossible to perform one minor task without introducing side effects that may either help or hinder in other minor tasks. It is difficult to drive two or three steers out of a herd of cattle, for instance, without taking others along as well. We may not object to these others coming along, or we may want them to stay. If we want them to stay and try to drive them back, we may find that one or more of those we do want are also driven back.

In teaching, as in herding cattle, side effects are bound to occur. Some of these will be all to the good. They will be things we wanted to do anyway. This makes for facilitation or useful transfer. Other side effects may be neutral. Still others of these side effects may create conditions we do not want. In taking care of these harmful conditions, moreover, we may well undo some of the useful things we have just accomplished. Here the side effects make for interference.

The Interaction Between Two Tasks

Look briefly at Figure 9.1. It suggests that in certain areas of teaching we need give little thought to the possibilities of interference or facilitation. In other areas, however, we find distinct opportunities to reap the rewards of facilitation. In still other areas there are serious risks of interference. When can we ignore the problem of facilitation or interference? And when must we give serious attention to these matters?

Material That Is Highly Structured Insofar as we have been successful in using structure or meaning in our teaching, we need give only moderate attention to the possibility of facilitation or interference (Hall, 1955). When we have succeeded in developing a clear-cut structure, each of the different things we have taught will occupy its own neat place in that structure. So long as this structure is the conspicuous feature in the student's mind there is little danger that the individual items within it will affect each other in a worrisome way. If some new item disturbs the structure, however, as new items sometimes do, we may well find a reduced mastery of the things that make up the structure. If the new item fits neatly into the existing structure and helps complete it, the net effect will be an increased comprehension of the structure and of the items making it up. But these effects are incidental to the problem of creating and maintaining a useful structure.

There is some argument, by the way, about the extent that structured or

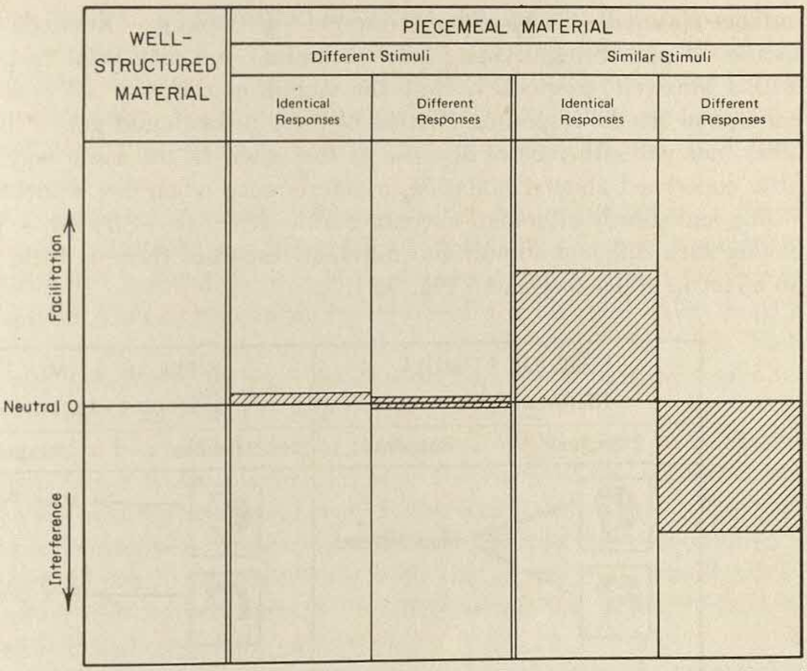

Figure 9.1. Showing when experience with one task affects the mastery of another.

meaningful material is completely immune from the risks of interference. Later on, we go into this problem in more detail. For the present we need merely remember that our worries on this problem are largely confined to unstructured details.

Piecemeal Tasks As we have seen so often, it would be unrealistic to assume that we can teach everything in highly structured form. In the first place, many of the things we have to teach do not fit into any very impressive structure. In the second place, although we *present* some items in structured form, the student may actually perceive those items as an aggregate of separate piecemeal tasks. And in some, but not all, piecemeal tasks, there is the possibility that these separate tasks may have some effect on each other. Figure 9.1 shows when this is likely and when it is not.

The independent separate tasks which have possibilities for interference or facilitation can readily be expressed in stimulus-response form. Consider such tasks as $8 \times 7 = 56$; capital of Australia—Canberra; Water—H_2O; Canis—dog. Each of these tasks can be separated into something that we encounter (stimulus, question, problem) on the one hand, and some behavior that is required (response, answer, solution) on the other.

Tasks Having Different Stimuli Suppose you had to learn the names of a number of people, as in a college class. When you see a certain young man, for instance (stimulus), you should respond by thinking, "Kenneth Brown" (response). Upon seeing a young lady (stimulus) you may want to be able to say "Hilda Maxwell" (response). Here the stimuli of the two tasks are quite different and so are the responses. Neither of these tasks should get in the way of the other, nor will either be of any use to the other. In the same way, we need be little concerned about facilitation or interference when our students learn *canis* —dog and shortly afterward encounter $a^2 - b^2 = (a - b)(a + b)$. For tasks having such different stimuli and different responses there is little likelihood of an effect in either direction (Fig. 9.2).

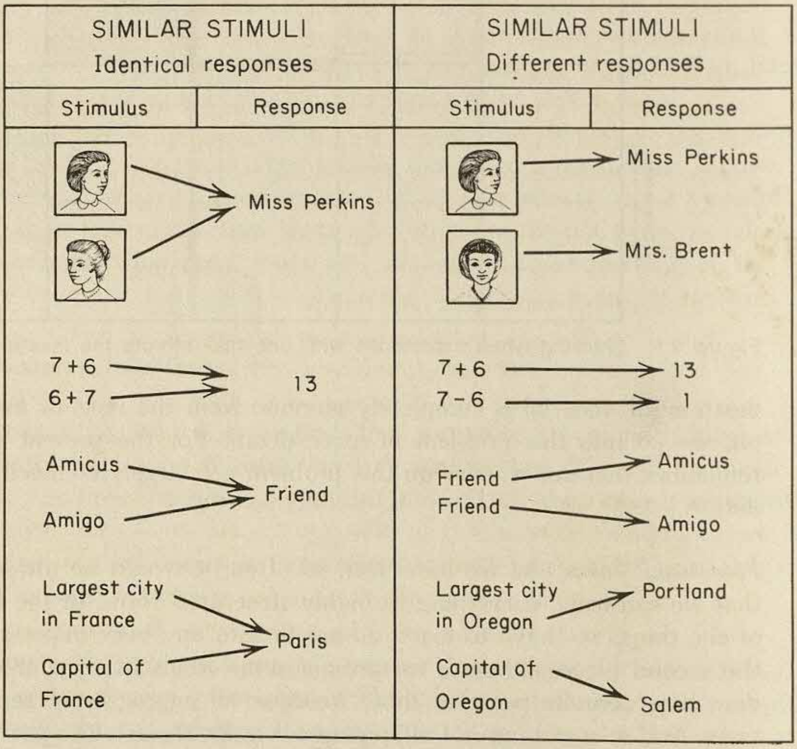

Figure 9.2. Illustrations of mutual facilitation and interference arising from two separate tasks.

It is possible that two quite different stimuli could call for the same response. Two young men (stimuli) having no resemblance to each other could both be "Mr. Brown" (response). *Canis* and *der Hund* could both call for the answer "dog." For both "$4 \times 25 = ?$" and "number of senators?" the proper reply could be one hundred. Even in such cases, however, there will be little interaction between the two tasks. If anything, each may help the other slightly. But the responses do not matter so much. So long as the stimuli are different, the two tasks have little chance to affect each other one way or the other.

Similar Stimuli and Identical Responses In learning the names of a college class you encounter a young lady, and to this stimulus you should respond by saying "Miss Perkins." This is only one of many such associations or tasks that you must master. Suppose your score on this particular task is just about 50 percent. Half the times you see her you think of her name. Half the time the name eludes you.

Now you meet a sister showing considerable resemblance to the first Miss Perkins. In mastering this new task, or in making this new association, do you think the first association, with its moderate strength, would help or hinder? It would help. Your experience in trying to call the first lady "Miss Perkins" would help you to use the same name for the look-alike sister. This is an illustration of *proactive facilitation*. In such facilitation an early experience works forward to help you with a somewhat similar task in the future.

There is also a second kind of facilitation. What would be happening to the first association while you are learning the name of the second Miss Perkins? Before you met the sister your score in this first task was about 50 percent. What would it be after you had learned to call the sister by her proper name? It would be much higher. Your experience with the second task would work back to strengthen the rather tentative earlier association. This backward-working process is called *retroactive facilitation*.

Mutual facilitation, both forward or backward, is to be expected *whenever the two tasks have similar stimuli and call for identical responses.* In classroom work, for instance, the two tasks, 3 × 4 = 12 and 4 × 3 = 12, have somewhat similar stimuli, or questions, and call for identical responses. The two tasks *amigo*, "friend," and *amicus*, "friend," also have similar stimuli and call for identical responses. Each would facilitate or support the other.

Identical Stimuli and Similar Responses At times we may encounter two tasks that have identical stimuli which call for somewhat similar responses. Upon seeing the French word *heureux*, for instance, we learn to think of "happy," and thus form the association *heureux*—happy. Later we are required to form the association *heureux*—delighted. The two tasks have identical stimuli and the responses involved have quite similar meanings, or meanings that are quite compatible, if not strictly interchangeable. Here we will find much *proactive facilitation.* Having learned the first task, we will find that the second task will be mastered with little effort. Under these circumstances, moreover, there will be little or no confusion if we are again required to respond to *heureux* by saying "happy."

The results just described fit in with the notion of *clustering* (Chapter 7) and with the concepts of information theory, or the reduction of uncertainty. When you are first asked to give the English equivalent of a completely foreign word, the correct answer could be almost anything. The uncertainty is as large as the total number of English words. When you learn that the correct word is "happy," however, you also unconsciously respond with a general cluster of words to which the word "happy" belongs. Whenever the foreign word occurs again, this general cluster will be vaguely invoked. Insofar as it does operate, it acts as a *set* (Chapter 8) and limits the number of possibilities that will occur to you, thus reducing the amount of uncertainty and the detailed searching to be done. Whenever the new word is to be found within this cluster, the whole process proves to be a great help. If a word from outside the cluster is needed, this set, with its limitation on the apparent area of uncertainty, would prove to be a hindrance.

Similar Stimuli and Different Responses Life would be much more simple, and also duller, if similar stimuli always called for the same response. But as it is, our dog may be petted, but the similar strange dog must be given a wide berth. Mushrooms are to be eaten, but the similar toadstool is to be avoided.

Let us go back to the time when you knew only one "Miss Perkins" and did not know her very well. Now you meet a third sister, also resembling the first, but going by the name of "Mrs. Brent." As in the other illustration, she is one of many people you meet and you must make some effort to remember her name. Will it be easier or harder for you to call Mrs. Brent by name from having known the somewhat similar sister as "Miss Perkins"? It will almost certainly be harder. You would find it easier to call this third sister by her name if you had never known the first sister as "Miss Perkins."

This sort of interference in which early learning works ahead to hinder later learning is called *proactive inhibition.*

Interference can work backward as well as forward. After spending some time in learning to call this third sister "Mrs. Brent" you will find that you will be less successful than before in calling the first sister by her right name. This troublesome process goes by the name of *retroactive inhibition.*

This sort of interference is often encountered in the classroom. A pupil encounters the symbol d o g and must learn to say "dog." Shortly afterward he meets d a y, which, to him, is exceedingly similar. Now, however, he must come to say "day." Each of these tasks will get in the way of the other. The second task, d a y—day, will be more difficult to master because of the experience with the combination d o g—dog. The partial mastery of the first will be reduced by the experience with the second (Postman, 1961). The tasks $4 \times 3 = 12$ and $4 + 3 = 7$ also have stimuli that appear similar to the young child. They call for quite different responses. Here again we can expect each to interfere with the other.

Conditions Affecting the Amount of Interference

There is a risk of interference whenever two similar stimuli call for different responses. But such interference does not always occur. At times, as we have seen, the experience with one task can help with the mastery of another, even when the responses are dissimilar in one way or another. We now consider, in more detail, the conditions under which interference is likely to be a serious problem, and those other conditions in which there is little, if any, interference.

Incompatible Responses At times, whenever one of two responses to a stimulus is correct, the other must be wrong. If "Mrs. Brent" is the correct response, "Miss Perkins," though forgivable, must be wrong. If "12" is the answer to 3 × 4, "7" must be wrong. At other times, two responses could be different but still quite compatible. In deciding whether to translate *heureux* as "happy," as one possibility, or "delighted," as the other, you are not trying to decide between something that is clearly right and something else that is clearly wrong. Each of these choices merely represents a minor variation of the same general notion. To take a different illustration, the fire ranger at one time could respond to the sight of the fire by calling, "Fire!" At another time he may be required to press a button. Again these two responses are quite compatible. He could do both at the same time. Doing one would not prevent him from doing the other.

It is when the two responses are incompatible with each other that we can expect the greatest interference. When the two responses are compatible there may be no interference whatever. Indeed, in some cases we may find a slight facilitation.

Responses Easily Confused In some tasks, the different responses to similar stimuli are quite different. In other tasks, the two responses could easily be confused with each other. Your friend Jones, for instance, lives in Mifflinburg, and you have formed the association *Jones-Mifflinburg*. He moves to Sacramento and you must form the new association *Jones-Sacramento*. Here the two responses are easily distinguished and you would probably experience only slight interference. Suppose, however, he had moved to Mifflintown and you had to change from *Jones-Mifflinburg* to *Jones-Mifflintown*. Here the responses are easily confused and the resulting interference could be very great (Bugelski and Cadwallader, 1956). To take another example, suppose you learn *fressen* "to feed on" (horses feed on hay), and now encounter *essen*, "eat" (people eat bread). It would be easy to confuse these two different responses to the somewhat similar stimuli. Under these conditions we might get a great deal of interference. There should be less trouble from interference if *fressen*—"feed on"—were followed by *fassen* "grasp." Here the stimuli are somewhat similar but they call for responses that can easily be distinguished from each other.

Responses Important in Their Own Right Some responses are regarded as correct or incorrect regardless of the consequences. Calling a person by the wrong name, for instance, makes you feel foolish whether or not the person takes offense. Stopping at a stop light is correct, whether or not this enables you to avoid a collision or escape a fine. The answer to "3 × 4" is "12," no matter what might follow from this response.

Other responses are not important in their own right, but are merely incidental steps by which we accomplish results that really are important. The specific response by which you sound the automobile horn, for instance, is not important. The important thing is that by one means or another you get the horn to sound. You may do this with your thumb, with the heel of either hand, or with a forearm. A few minutes later you may not remember which movement you used.

It is when the different, incompatible responses are important in their own right that interference is likely to occur. When each response is merely an incidental means of accomplishing the same major results, we may get little interference or even facilitation. When the rain starts coming in the car window, for instance, you rotate a handle clockwise and shut the rain out. You change to a different car and now you must use a counterclockwise motion to obtain the same important result. How much interference will you encounter from these two tasks, each calling for a different response? Probably very little. Sometimes one may help the other.

The General Concept of Similarity

In the preceding discussion there has been much talk of similarity or the lack of similarity and of the part that similarity plays in facilitation or interference. At times, however, it has been difficult to say just how two separate stimuli or two separate responses are similar. In one sense, for instance, the letters *b* and *d* are somewhat similar since they have many elements in common. In another sense, however, the letters *b* and *B* are even more similar since, in isolation, one of these could be substituted for the other. In this latter sense the letters *b* and *d* are not similar at all. In this sense two stimuli are similar when each acts as a representative, or an illustration, of the same general notion. The letters *b* and *B* are both representatives of the spoken sound "bee." Either one serves that function equally well. Either one of our young ladies in Figure 9.2 can be considered as a representative of the cluster known as the "Perkins sisters." In this capacity one of these "stimuli" could be substituted for the other. Deese (1964), following Professor Bousfield, has placed great stress on the similarity, or equivalence, of two stimuli that represent the same general concept.

Responses, like stimuli, can also be considered similar in either of these senses. Two responses could have much in common. Striking the letter "a" on the typewriter, for instance, calls for many of the same movements that are used in striking the letter "z." Two responses, on the other hand, could also be considered similar because one could be substituted for the other (*compatible responses*) or because either one could be used to accomplish the same general result (*mediating responses*).

Whenever the two stimuli or the two responses are similar in the representational or the mediational sense, there will be an increase in the amount of facilitation and a reduction in the extent or likelihood of interference. When the stimuli of the two tasks (*b* and *B*) merely stand for the same thing, or when one can be substituted for the other, then in learning to make a response to one of these, we have almost completely learned to make the same response to the other. When the responses of the two tasks (sounding the horn with the left hand or sounding it with the right) are merely two different ways of mediating the same result, and when one of these mediating responses could easily be substituted for the other, then we face little risk of interference and may even encounter facilitation (Ellis, 1969b). Stimuli that are similar merely because of the details they have in common will produce less facilitation. And responses that are similar merely in this way could make for interference rather than facilitation.

Reducing Interference

Figure 9.1, summarizing what we have just said, suggests that interference becomes a problem only under very special conditions. We face serious risks only when the material is made up of separate, unstructured tasks; and when these tasks present similar stimuli, which in turn call for responses that are different, confusable, incompatible, and important in their own right. Actually, however, we will find many school tasks that fit this seemingly narrow category. On second thought, this is not surprising. These tasks that are so subject to interference are, for that very reason, difficult to master and they call for much application. The other tasks can be mastered with less effort or attention. Since the school is specifically charged with the direction of learning, it would seem reasonable that it should be made responsible for important tasks that call for sustained application.

However that may be, we do find within the curriculum many somewhat isolated tasks that have similar stimuli, "Sioux Falls; Sioux City" that call for responses, "South Dakota; Iowa," that are different but easily confused. Typically, only one of these could be correct for a given question, and its correctness is a final thing in its own right, not merely a means to some other end.

All in all, interference is a most serious problem in schoolwork. Interference can be blamed for much of the difficulty we face in learning a new task. It is also chiefly responsible for the forgetting of material after it has once been mastered.

Develop Structure It is when the tasks are separate and free-floating, so to speak, that interference is likely. According to a number of psychologists (Ausubel, Stager, and Gaite, 1969; Ellis, 1969d) the major *ideas* in meaningful material are not likely to be harmed by the study of later material. At one time it was thought that even the details of meaningful material would not be affected by retroactive inhibition provided those details were thoroughly embedded in some surrounding structure. Later studies (Anderson and Myrow, 1971; Crouse, 1971; Entwisle and Huggins, 1964) however, have shown that some aspects of meaningful material are subject to retroactive inhibition. The

Retroactive Interference in Connected Prose

Four groups of 20 college students each read a brief biography, 212 words, beginning as follows: "John Payton was born in Hampstead at the end of October 1795. When he was eight years old, his father, who kept a livery stable, was killed by a fall from a horse. . . ." The students were then given a test of 22 items, each calling for one or two words. After this test each of the four groups was given different *interpolated* experience. One group (identical stimuli) read two versions of the same story with details changed (Payton was born in *Liverpool* at the end of October *1810*. When he was *five*, his father, who was a *servant*, etc.), and were tested on these new versions. A second group (similar stimuli) read two similar biographies about different people (*Fowler* was born in Liverpool at the end of October 1810) and were tested. A third group (different condition) read a brief article about an imaginary island, and a second about an imaginary library, tests being given at the end. A control group had no interpolated experience of this kind. All four groups were given the original questions as a final test.

	Number of Correct Answers			
Interpolated Task	*Original Task*	*First Interpolated Task*	*Second Interpolated Task*	*Final Test*
Identical stimuli, different answers	13.6	14.8	14.9	7.7
Similar stimuli, different answers	13.8	13.6	14.5	6.6
Different stimuli, different answers	13.2	15.0	13.7	12.8
None (Control group)	12.7			12.3

SOURCE: James H. Crouse, Retroactive interference in reading prose materials, *Journal of Educational Psychology*, 1971, **62**(1), 39–44.

question may hinge on whether we test for the general substance of the original learning or on the more detailed facets.

Even though well-structured material may not be completely immune to interference from other learning, it is less subject to damage from this source. Certainly it seems wise to make as much use of this fact as possible. If each task is conceived as an integral part of a larger structure, there is less to worry about.

Even when we cannot incorporate the whole of each task into a structure, we can often work out some usable structure. We can sometimes connect each of the two different responses with its own proper structure. At one time the student must learn to think "friend"—*amicus*. At another time he may have to think "friend"—*amigo* (Fig. 9.3). There should be little interference, however, if the student has a clear feeling for Latin and Spanish as different structures, and if *amicus* is unmistakably a part of Latin and *amigo* as unmistakably belongs to the structure of Spanish. If a student can clearly see why the rule for multiplying powers differs from the rule for multiplying digits he will not let $3 \times 4 = 12$ get in the way of $a^3 \times a^4 = a^7$.

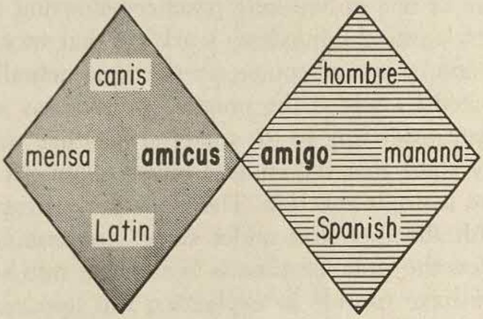

Figure 9.3. Interference is less when the different responses are firmly embedded in separate structures.

It may often happen, of course, that we cannot lay our hands on two different convincing systems to which we could assign each of the responses. Even here, however, we can sometimes achieve the result we wish by using the very inconsistency or paradox as the basis for our structure. "Since morphine quiets dogs, you would think it would have the same effect on other carnivores such as cats. Actually, however, morphine tends to excite members of the cat family." "You would think that 'ague' and 'plague' would rhyme, but. . . ." "From other constructions you might think that *ne que* means 'not only.' Really it means 'only.'" In such instances the very discrepancy, which would ordinarily lead to confusion, can be made the basis for a structure into which the contrasting responses can be effectively fitted.

Spaced Practices Although structure should be used for predictable and important sources of confusion, it is too much to expect the teacher to take care of the major share of interference in this way. In the rote learning that is going on, each student will experience thousands of stimulus-response associations, and the possibilities for interference will often differ from student to student. Clearly the teacher cannot work out an elaborate structure to take care of each possible case of interference.

To combat this random, unpredictable interference, it is often, though not always, useful to try to arrange for frequent breaks in the practice sessions (Keppel, 1964; Underwood, 1964, 1961). This fact, by the way, has proved to be a bit of an embarrassment in the field of psychology. For one thing, it does not always hold. In some areas, not surprisingly, the interruption of a practice period introduces some frustration and slows up the learning (Ryan and Macmillan, 1970). For another thing, there are many theoretical reasons why it should not hold. Bugelski (1962), for instance, points out that any task requires a certain amount of time for its mastery, and that, basically, it should not matter if the total time required were broken up into many short practices or merely took the form of one or two long practices covering the same total time. And in some kinds of learning things may work out that way (Cooper, 1969). This total-time hypothesis refers, of course, to the time actually spent in study. It would not be expected to hold if the practice period was so long that the student got bored and quit attending to the material. Neither would it hold if the practices were so very short that the student never really got started, or if he never had time to make a single reaction. These theoretical expectations, of course, cannot do away with the fact that under some circumstances learning really is more effective when the practice time is broken up into smaller units. But even here psychologists have trouble in explaining this apparent fact. Hilgard and Bower (1966, pp. 318–328) describe a number of attempts to account for this advantage and show the difficulties encountered by each of these.

However shaky the theoretical basis, the classroom teacher can afford to be guided by the undigested trends of the experiments. A student about to study for a play, for instance, must memorize it word for word, since other players use these words for their cues. In this task he might do well to study in periods of not more than ten to fifteen minutes each. At the end of each period he could do one of two things. He could merely rest for a minute or so. Rest periods of this length accomplish about as much as longer rests. Or he could interrupt his practice for a longer period and use this longer time to study something else.

We might advise our student that almost any reasonable system of spacing his practices will work fairly well. If he wants to go further in his search for efficiency, he should perhaps cut his practice periods down to the minimum consistent with the practical circumstances. A one-minute practice, for instance, might be quite efficient under some circumstances. It might be impractical, however, if it took him five or ten minutes to get his desk cleared of other material, to get the light and papers arranged, and to develop a set for memorizing. If he is to spend five or ten minutes in the incidentals, he might spend almost an equal amount of time in practice. When our student has worked out a practice period that is reasonable and short, he can adopt almost any convenient schedule of intervals between practices.

In general teaching, by the way, there are many times when we can use exceedingly short practice periods to great advantage. A lively one-minute drill could accomplish a good deal. By the same token, we can be grateful for the many brief rest periods that circumstances provide. In some kinds of learning, a rest period of a few seconds may prove very valuable. Students seem to have some built-in intuition of this fact and are very often able to work out brief rests, or brief periods of inattention, with little help from us.

Teaching for Retention

Not all learning, of course, is carried on with serious retention in mind. In trying to learn the name of some esoteric beast, for instance, we may need to remember it only long enough to enter it in the crossword puzzle. In much of school learning, however, a moderate amount of retention is assumed. If we are realistic we will insist on no more than a moderate amount, but unless there is a degree of retention, some people might see little justification for teaching or for the schools.

Memory, Retention Tests, and Related Processes

In his book on the subject, Adams (1967) makes a distinction between *memory*, on the one hand, and the results of a *retention test*, on the other. Memory refers to the items that are actually stored away on the memory drum or in the "files." The retention test refers to your ability to put your hands on any one item at that moment. People often express this difference intuitively when they say, "I know it as well as I know my own name, but I can't put my tongue to it." Filing an item away so that it will be there is one problem. Putting your hands on it is another problem. This is the problem of retrieval. Many things may prevent you from retrieving something that is really there—fatigue, distraction, or a set that gets in your way. In measuring retention that is difficult to retrieve, different kinds of retention tests give different results. Suppose, for instance, that some time ago you learned to count up to ten in German. To test your present retention we could ask you to *recall* these ten numbers in order. This is the most severe test. Even if you failed it, or recalled only one or two numbers, you might do very well on a test in which we presented the ten German numbers in scrambled order (*ein, vier, zwei,* etc.) and asked you to *reconstruct* the list in the right order. If we asked you to *relearn* this counting task, moreover, we might find much *saving* over the time required for the original learning. As the most sensitive test, we might present you with these ten German words all mixed up with other German words and ask if you could *recognize* the ones you had seen before. A positive score on any of these tests would show that there is something stored in your memory, even though you cannot always retrieve it.

Interestingly enough, the process of testing for memory may affect the memory itself. When students are asked to recall some material they have heard, the report they make, whether accurate or in error, will affect their subsequent memory. A student will continue to remember an event as *he reported it* even if he is corrected after each erroneous report (Howe, 1970).

The Tendency of Students to Remember Their Own Previous Answers

Each week for four weeks, some 22 graduate students listened to the reading of a 160-word prose selection and then attempted to recall it as accurately as possible, but concentrating on ideas more than the actual words. The reproductions were later graded and given a score for both meaningful recall and verbatim recall.

	Average Scores on Successive Recalls			
	1st Week	*2nd Week*	*3rd Week*	*4th Week*
Number of meaningful units recalled	8.1	8.5	10.0	11.7
Number of words correctly recalled	29.8	24.9	37.2	43.4
Number of wrong words added	51.7	55.9	58.3	57.4
Probability that a word used on a given trial (say, trial 1) would be given on the next trial (trial 2):				
Words correctly recalled	.48	.73	.74	
Wrong words (not in material)	.21	.29	.37	

From the last row of figures we see that an error incorrectly added on one trial has a fair chance of being repeated, even though the student hears the correct version after each attempted recall.

SOURCE: Michael J. A. Howe, Repeated presentation and recall of meaningful prose, *Journal of Educational Psychology*, 1970, 61(3), 214–219.

Recently this problem of retrieving items from the memory has received much attention. Some psychologists suggest that this retrieval process resembles the process of detecting faint signals from the outside world, as when we are instructed to report the slightest rustle from darkness. A rustle may well occur and we may fail to hear it. Conversely, in this vigilant search we may "hear" a sound that does not exist. Similarly, in the frantic search of our own memories there may be a trace that we fail to take seriously, or we may mistakenly report a trace that is not really there. A number of psychologists (see Banks, 1970; Lockhart and Murdoch, 1970) hold that the detection of outside signals and the retrieval of items from our own memory may be governed by the same principles.

The Function of Memory What uses do we make of memory? Gagné (1970) reminds us that memory can be used for *temporary holding,* for some *mediational purpose,* or as a *permanent record.* After using the card catalogue to get the call number of a book, we need remember this number only long enough to write it down. Most of us would be unwise to try to remember it until we had actually found the book. Such memories are born to perish. Occasionally, as when we have to look up the telephone number a second time, we might wish it would last a little longer. But for the most part, it is better that these countless minor memories should gradually erase themselves. But this is not true for the mediational memories. To be useful these must last for an appreciable time. And often no harm is done if they last forever. Suppose, for instance, that it is important for you to understand the processes of problem solving. To do this you are asked to work out a sample problem. To do this in turn you will have to remember, *for a time,* some things about Donald and Gerald and Robert (Remember them?). You should keep some of those facts in mind until you have grasped the principle of using constraints (Remember that?). After you have grasped this principle, however, you could well forget about Donald and Gerald and Robert, but it would not hurt if you still remembered them. In contrast with these memories that should or could fade after a shorter or longer time, there are the other memories that you should retain indefinitely—your own name, for instance, or—grim thought—your identification number, the foods you cannot eat, the remarks you must *never* make again.

Short-term versus Long-term Memory Since memory may serve either a temporary need or an enduring necessity, we might not be surprised if Nature had provided two separate mechanisms for these different jobs. Whether she has done so or not is a matter of some dispute. At mid-century Donald Hebb, in an elaborate theoretical treatment (1949), suggested that there were indeed two distinct neural mechanisms at work. The first consisted of a reverberating neural circuit, passing around and around a loop of neurons with steadily diminishing intensity. While this was still in motion it acted as a fainter and fainter basis for memory. The second mechanism consisted of a structural change between neurons as if some chemical process brought parts of two neurons closer together or reduced the resistance which insulated one from the other. Unless disrupted by some other force—which often happens—this change should last as long as the neurons last, and could thus become the basis for long-term memory. All memory starts out as this spinning top gradually coming to rest. Before this energy comes to rest it may produce a long-lasting structural change, and then again it may not.

Psychologists disagree about whether or not it is necessary or helpful to assume the existence of two separate kinds of memory. In his discussion of problem solving, for instance, Simon (Chapter 8) bases his theory on the difference between the temporary, readily available, holding memory and the more permanent but more cumbersome filing system. Adams (1967) also concludes that it is difficult to explain many of the experiments without assuming the existence of these two kinds of memory. Melton (1963), however, in an early analysis, questioned the need for this distinction. He thought it better to assume that memories can last for a very short time, an intermediate time, or for years, but that the same mechanisms were at work in each case. In a more recent summary, Ellis (1969c) calls attention to the dispute and discusses the difficulties that will be encountered by anyone who assumes that there are two separate processes.

Theories of Forgetting Whatever their views about the existence of two separate kinds of memory, all psychologists, of course, admit the existence of the more lasting memory system. When this memory system fails, moreover, and when forgetting takes place, it is fairly well agreed that the trouble comes from interference of the type discussed earlier. The student's long-range failure to remember any single item is due largely to the interference from other learning. Some interference comes from the things he learned before he came across the item in question (Underwood, 1957). Additional interference comes from the things he learned after he experienced that item.

The student's failure to remember may also come from active repression of material that is unpleasant (McGeoch and Irion, 1952), uncongenial, or threatening to the ego. As we have long suspected, a person is more likely to remember things that are flattering or that boost his ego than things that are derogatory (Taft, 1954).

Among those who stress a separate short-term memory, forgetting is assumed to come largely from simple decay. This is similar to the familiar sensory decay we experience when we look at a bright light and then close our eyes. We continue to see the light even after the actual stimulus has been cut off, but the intensity of this *positive afterimage* decreases steadily and is lost in a matter of seconds. The energy responsible for the short-term memory may vanish in similar fashion.

The proponents of a short-term memory system do not rule out the possibility of interference in this transient memory. It is fear of this interference that leads us to say to our companions, "Just a minute till I get this down." But with this kind of memory it is distraction that is the villain, and any one kind of distraction is almost as bad as another, although it is true that when we are trying to remember words or numbers, other words or numbers may provide more interference than, say, a light coming on, or a pronounced change in temperature. This kind of distracting interference, however, is held to be different from the interference that disrupts our long-term memory. In this latter process, as we have seen, one kind of new experience (calling a look-alike sister by the same family name) may produce no interference whatever, whereas a different experience could be quite disruptive.

Retention of General Psychology

Some 35 students completed a course in general psychology in June and then enrolled in a course in educational psychology in September. A test given to these students early in September included 19 items that had been in the final examination taken the previous June. The average score on these 19 items in June was 14. In September, after a lapse of three to four months, the average score was 13.4. The score on these items before taking the course in general psychology was 10.3.

SOURCE: W. J. McKeachie and D. Solomon, Retention of general psychology, *Journal of Educational Psychology*, 1957, 48, 110–112.

Prevalence of Forgetting

There are dependable records of remarkable individuals who seem to remember almost everything (Luria, 1968). They rival the almanac in their memory of dates, athletic records, weather statistics, and similar details. Some of these memory experts deliberately use gimmicks or other mnemonic devices (Chapter 7). Others seem almost the unwilling victims of this mass of isolated detail that clutters up their minds.

But this is most unusual. Some forgetting is the rule. By definition, the contents of the short-term memory are headed for oblivion soon after acquisition. More substantial content may also escape us. When forgetting does occur, most of the loss occurs soon after learning. After that there is a slower, but steady, decline. As might be expected, there is marked forgetting of more technical and advanced scientific material that is little used in everyday life. In one study, for instance, almost 75 percent of college botany was forgotten in one or two years. There is somewhat less forgetting for material that we often come across in reading or in ordinary experience. Some studies report a drop of only 20 or 30 percent in grade school history or introductory psychology (Benschoter and Charles, 1957; McKeachie and Solomon, 1957). This, of course, is still a substantial amount of forgetting.

Residual Uses of Forgotten Material

There are a few bright spots, however. In the first place, general principles or other meaningful material may be retained with little loss (McDougall, 1958) or even a definite gain. These are the general principles which the student grasps thoroughly and which he may review over and over again in his reading and thinking.

In the second place, material that has been learned and seemingly forgotten is seldom completely forgotten. Even when it cannot be recalled outright, it can often be relearned much more quickly than when first studied. In one experiment (Burtt, 1937) passages from Greek drama were read, in the original Greek, to a boy of fifteen months. Seven or eight years later the boy memorized both these passages and comparable selections to which he had never been exposed. He took 30 percent less time to learn the selections read to him as an infant.

Material that cannot be clearly recalled or reproduced can often be recognized. When someone mentions the "Diet of Worms," for instance, we can at least remember that this is one of the things that we have studied. And even this modest sense of familiarity is worth something. In relearning this recognized subject we would feel more confidence than in learning some new subject that may hold unknown terrors.

Forgetting During the Summer Vacation The facts revealed by the many investigations of summer forgetting fit in readily with our commonsense expectations (Parsley and Powell, 1962; Stroud, 1940). When the skill acquired during the school year is consistently employed during the vacation, as in the case of reading, there is very little forgetting and there may even be marked gains. Naturally enough this is especially true for older children and for brighter children who do more reading anyhow. The summer vacation does less harm to meaningful material than to material that is learned by rote. Ability to solve arithmetical problems, for instance, suffers only a slight loss, although some loss does occur. Arithmetical computation, on the other hand, often undergoes a severe decrement. In one investigation, the summer loss was not made up until December of the following term. There is some evidence, by the way, that specific training at the close of the school year may reduce the summer loss in arithmetic. Spelling ability, like ability to compute, also decreases during the vacation. The loss is especially severe for the younger students, who presumably make less use of spelling in their vacation activities.

Factors Affecting Retention

As we have seen, retention varies considerably from material to material and from one condition to another. Let us look at those conditions that affect retention and, in so doing, try to determine what the teacher can do to obtain a reasonable degree of retention on the part of his students.

Speed and Effort of Learning In the world at large there is a belief that the rapid learner is sort of a "flash in the pan," that he learns quickly and forgets quickly. This same belief holds that the slow learner has superior retention.

People often remark, "It takes me a long time to learn anything, but once I do get it, I never forget."

What is the truth about this hare-and-tortoise philosophy? If we take different people we find that the fast learner tends to retain things better. But the fast learner is also a better learner in the first place. He gets more out of a single practice than the slow learner. That is what makes him a fast learner. Consequently, the fast learner begins his forgetting with more to go on. He could forget more and still come out ahead. If we allow for this difference in original mastery, and arrange things so that the fast learner and slow learner start their forgetting at comparable levels, we find little difference in the rate of forgetting (Shuell and Keppel, 1970; Underwood, 1954).

The hare-and-tortoise view of folklore not only stressed the advantage of a slow pace. It implied that it is when we really exert ourselves, or undergo some experience of stress, that we retain what we studied. There is an echo of this ancient belief in the theories of Festinger (see Tedeschi and others, 1971; Lawrence and Festinger, 1962; Festinger, 1961). According to this theory we love (and remember) those things for which we have been made to suffer. ("I paid so much for it. It *must* be worth a lot.") Material learned under difficult conditions—provided the material really is learned—should be better retained. And there is some evidence (Buenz and Merrill, 1968) that students retain material better and value it more highly when they have been required to go to some trouble with it. Retention is improved also (see Chapter 6) when the student goes for some time before learning the correctness of his answer (Phye and Baller, 1970). Hopefully, this interesting theoretical possibility will not lead to the reintroduction of the idea that learning must be uncomfortable.

Notice that we make a clear distinction between the conditions that favor original acquisition (Chapters 5 and 6), on the one hand, and the conditions that favor retention, on the other. When response competition is high, we realize that excessive anxiety will hinder the acquisition of the correct response. But to hinder is not necessarily to prevent. And whenever the student does succeed in acquiring the response under these adverse circumstances, we know that he has met and mastered most of the difficulties connected with it. Having thus met and mastered these difficulties, he may have more success in retaining this response than in retaining one that came easily without having its associated difficulties threshed out at the time of acquisition. But, obviously, any suffering your students experience will do no good unless some learning actually takes place under these stressful conditions.

Meaning or Structure Of all the factors that affect memory, meaningful structure is perhaps the most important for the teacher to keep in mind. If the material is sufficiently meaningful, there may be no forgetting whatever. An important governing principle, like the old idea of the conservation of energy, may so help us organize the rest of our ideas that it stays with us for life. Content that is not so brilliantly structured, but that still has much meaning, will be remembered in proportion to its meaning (McGeoch and Irion, 1952). Nonsense material is headed for extinction before the last syllable is uttered. Much of the advantage of meaningful material may come from the fact that it is better learned to begin with. There is some suggestion that when rote or nonsense material is as well learned as meaningful material it may be retained just as well (Postman, 1961; Underwood and Postman, 1960).

The more the student can be made to see the material as an organized group of large governing principles, the better he will remember. The moral is obvious; the practical application is difficult. Large (and true) governing relationships are sometimes hard for young students to see. And, remember, it is the student who must see or experience these relations, and not merely the teacher. Sometimes the teacher may labor at relations or principles which are beyond the grasp of the students at their particular level of maturity. All in all, however, the gains from clear understanding and from a sure grasp of principles are so great that the teacher may well lean over backward to try to secure them. The steps that enhance meaning and insight (Chapter 7) are the surest guarantee of more permanent learning.

Motivation The motivation that is present during learning has a marked effect on retention. Students who learn material under a high degree of ego involvement show a higher level of retention throughout than students who learn under more prosaic motivation (Alper, 1948). But it is the motivation that is present during learning that counts, and not the motivation that the student feels after the learning is over. After a student has finished his study it does little good to tell him that he should expect to be tested (Ausubel and others, 1957). Such a statement before he begins his study, however, may well increase his retention.

Overlearning Retention is clearly affected by the amount of practice during learning. If we have spent much time practicing one set of material and little time on another comparable set, we shall find that our retention at a later date will be in almost direct proportion to the amount of practice.

For both teacher and student, it is important to realize that practice carried on *after* we have first reached mastery of the material is of great value to retention (Krueger, 1929). This additional practice is called *overlearning*. Overlearning, by the way, takes a bit of "selling." Students who have achieved mastery are reluctant to go on practicing. When a student has studied a number of foreign words until he has gone through the list once without a mistake, it is most natural for him to assume that the job is done. He will not be happy about any suggestion of further practice. In spite of his feeling, however, he should not stop here. If he will go over the list many more times—even spending as much time after learning as he did before (100 percent overlearning)—he will have a much better chance of remembering the list in the future.

Review Review can occur immediately after a student has made a response, or it may take the form of a later restudy of material presented at a much earlier

What Happens When Motivation Is Applied After the Learning Is Completed?

The material for this investigation consisted of a 1400-word passage on opiate addiction. Two equivalent tests of 28 items each were constructed. During the fall semester a control group of 53 people studied the material at normal reading rate (about 8 minutes) and used the rest of a 25-minute period to memorize the facts and concepts. The subjects knew they would be given a test at the end of this period. They were also told that grades would not be influenced by performance on this test, although each student would receive his own marked test and would be able to compare his score with the class average. Two weeks after taking this test, they were given the other form of the test. They had no hint that such a follow-up test would be given.

Next term the same exercise was given to an experimental group of 44 students. These students, however, were told *immediately after taking the first test* that a follow-up test would be given in two weeks.

	Average Score on Immediate Test	*Average Score Two Weeks Later*	*Percent Retained*
Group Expecting a Follow-up Test	19.5	13.6	54
Group *Not* Expecting a Follow-up Test	20.1	13.2	48
None of the differences were significant.			

SOURCE: D. P. Ausubel, S. H. Schpoont, and Lillian Cukier, The influence of intention on the retention of school material, *Journal of Educational Psychology*, 1957, 48, 87–92.

date. Not surprisingly, there has been much gain from the analytic review of questions that the student has just missed (Merrill, 1970). As pointed out in Chapter 5, moreover, retention will be facilitated by Rothkopf's mathemagenic questions which follow material just encountered. For long-term retention, however, it may be better not to use too many of such postquestions (Natkin and Stahler, 1969). It has been suggested that part of the advantage of such questions comes from the activation or arousal (Chapter 5) they induce. With a great many questions, this arousal effect may wear off.

When a review is given sometime after the original learning, it could take the form of a test, or the review could be spent in restudying the material. Both types of review will help retention. Each method, however, has its own special value. Immediately after learning there should be a recall test in which the student is required to reproduce the material or to answer questions about it. At this stage, such a test will be more valuable than a mere rereading or restudy of the material, although the latter will be of some use. Later on, the test becomes less useful as an aid to retention. When as much as two weeks have gone by, it will be better to use the method of rereading or restudying in order to secure maximum retention (Sones and Stroud, 1940).

The Use of Transfer

The interfering side effects of learning are important and must occupy a good deal of our attention. Fortunately, however, they are not the whole story. Some side effects are useful, and these we should utilize when possible and should do our best to foster. By taking advantage of the automatic transfer that is ours almost for the asking, we can help the pupil acquire information and skill at a more rapid rate and with less effort all around. By taking steps to produce additional transfer, we can make sure that the skill and information which he does acquire will be useful in a wide variety of situations in and out of the classroom.

Transfer and Learning

It is difficult to make clear-cut distinctions between transfer, on the one hand, and learning, on the other. Broadly speaking, transfer refers to any process in which a student learns under one condition and then performs under another condition. Under such circumstances we ask, "Does the learning *transfer* to the performance?" When transfer is considered in this broad fashion, it is obvious that in any attempt to observe the effect of learning, we would be involved to some extent in the issue of transfer. If a student reads some material (*A*) and then tries to answer question (*B*), we clearly have two tasks, *A* and *B*, which differ to some degree. Clearly we are trying to see if experience with *A* transfers to performance on *B*.

The distinction is one of degree. Whenever the condition under which the material is experienced closely resembles the conditions of performance, we tend to consider that we are dealing with learning. Whenever, on the other hand, the two sets of conditions seem noticeably different, we tend to describe the process as one of transfer (Ellis, 1969a).

General Views About Transfer

Transfer of training has been one of the more controversial topics in education and in psychology. At one time people expected fantastic things from transfer. Samuel Johnson is reported to have said, "If a man can walk, he can walk east as well as west." By the same token, if he can remember one set of things, he can remember another. If a man spent much time in memorizing Chinese words, for instance, this experience would be expected to develop some general memory "power" or faculty of memory. The memory faculty thus developed could then be used to help him remember any item whatever. By virtue of his experience with Chinese he should be more adept in remembering historical dates, telephone numbers, poetry, wedding anniversaries, or batting averages.

Such an extreme view was bound to produce a reaction. Some psychologists questioned the very existence of such a thing as general memory power, or a faculty of memory. They produced data to show that *not all* the gains achieved from the study of one thing (judging areas of circles) would transfer to a similar task (judging the areas of triangles).

Apparently it proved difficult merely to say, "There is not as much transfer as people commonly assumed." This rather moderate warning gradually became changed to read, "Transfer occurs only rarely." For many years teachers were warned not to depend on transfer but to take specific steps to teach every separate thing the students should know.

The excesses in the early controversy have largely disappeared. Only a few people still expect miracles from transfer (Trow, 1958). Almost everyone realizes, however, that some transfer occurs. Sometimes there is a great deal, sometimes very little. All learning and all teaching are based on the assumption that transfer works to some extent. As we move from one day to the next, or from one lesson to the next, there are always some differences in the situations facing the student. Yet we assume that in this new situation he will be able to make use of the material he studied yesterday or last month.

At present the serious question is, "Under what conditions does transfer occur and how can such transfer be augmented?"

Taking Advantage of Automatic Transfer

As we learned earlier, some transfer is almost bound to occur whenever two similar situations call for the same response. Having almost learned the name of one Miss Perkins, we were well on our way to learning the name of her sister. Having learned to say "dog" when he sees his own spaniel, the child, with no further teaching, will say "dog" when he sees the neighbor's terrier. Having learned to say "6" when he sees 2 × 3, he will require little, if any, additional instruction to say "6" when he sees 3 × 2. Having learned to say "house" when he sees the letters *house*, he will have learned, almost if not quite, to say "house" when he sees the letters house. When we have taught him that the *largest city in France is Paris*, we have almost, if not quite, taught him that the *capital of France is Paris*, since for many people "largest city" and "capital" are all too readily confused. When we have taught him that this particular combination of winds, ocean, and mountains produces the grasslands of Nebraska, we have almost taught him that a similar combination produces the grasslands of Argentina.

Some General Aspects of Transfer

As might be expected, some of the things that transfer to later performance are quite specific. Learning to adjust one rear-vision mirror, for instance, may help in adjusting another. There are also some aspects of transfer which cut across tasks and which can be found to operate in many different situations.

Learning How To Learn Perhaps the most striking and important form of transfer is the development of a general *set* toward learning which results in learning how to learn. This has been shown dramatically when a monkey learns to solve a series of similar mechanical puzzles or problems in discriminating between similar objects. After much trouble with the first task, the monkey will stumble upon a general response, or approach, or *set* that gets results. With each succeeding similar task he will more and more rapidly invoke this general approach or response, solving the problem in much shorter time (Harlow and Warren, 1952). As with monkeys, so with pupils. After much wasteful movement in their early trials at problem solving, pupils will work out a more businesslike approach and will readily use this new approach or general response when they encounter somewhat similar problems.

Warm-up At times the experience with one task serves chiefly as a warm-up which then helps in performing a second task that follows immediately. Here we do not suppose that some specific skill or bit of information was acquired in the first experience and has been transferred to the later performance. The thing acquired is general energy or arousal, or a set toward activity. Any number of initial activities might serve this purpose, no matter what the nature of the skill they promoted.

Predifferentiation and Labeling The pupil is called upon to make finer and finer discriminations. He must make one response to the letters d a y and a quite different response to b a y. Yet the two words are very similar, and it may take the pupil some time to see just where they differ. Under these circumstances it may pay us to give him some experience, not in pronouncing the entire word, but merely in seeing just how the first letter of one word differs from that of the other. We hope that this exercise in differentiation will help, later on, when he returns to the main task of reacting correctly to each word.

There would be some help in making the differentiation even if the pupil were trained on distinguishing between the members of a different pair altogether. Learning to see the difference between *p* and *q*, for instance, might produce some transfer and might help the pupil overcome his confusion between "day" and "bay." But this training on an *irrelevant* stimulus discrimination would not be as effective as training on the relevant letters *b* and *d* themselves.

Does It Pay To Take Time Out To Differentiate Between Similar Stimuli?

A total of 107 pupils in 4 grade six classes were given tests in spelling and in word discrimination. They were then drilled in discriminating between similar collections of letters, "up" versus "uy," "banana" versus "banona." In each case the pupil merely indicated whether the two items were the same or different. Neither during the test nor in the subsequent drills was he asked to concern himself about the correctness of the spelling. Following the first tests, the pupils practiced on similar word discrimination tasks for 10 minutes a day. These periods were scheduled 5 days a week for 2 weeks, then 3 days a week for 4 weeks, and twice a week for 5 weeks.

A control group of 97 pupils from 3 grade six classes took the initial tests in word discrimination and in spelling. While the pupils just described were practicing word discrimination, the control pupils received *regular instruction in spelling.*

At the end of the 11-week drill or practice period, both groups took the two tests over again using comparable forms.

	Tests of Word Discrimination			*Tests of Spelling*		
	Initial	*Final*	*Gain*	*Initial*	*Final*	*Gain*
Discrimination Training Plus Spelling	24.5	28.4	3.9	26.2	30.1	3.9
Spelling Practice Only	26.8	28.6	1.8	27.4	29.7	2.3
Difference			2.1			1.6
Both differences are significant						

SOURCE: G. P. Mason, Word discrimination and spelling, *Journal of Educational Research*, 1957, **50**, 617–621.

Labels prove useful in predifferentiation. Students often spontaneously go in for labeling on their own. One geometrical figure may be labeled "bird beak," another "jib sail." When useful labels are supplied by the investigator or teacher, they help in later differentiations (Ellis, 1969c; Chan and Travers, 1966). If these labels do nothing else, they may limit the features of the stimulus that the student has to notice. When trying to differentiate between *b* and *d*, for instance, a label such as "belly on the right" alerts a pupil to the features that he should attend to.

Transfer in the School Subjects

In view of the many forces at work to promote some transfer, it is not surprising that most investigations report fairly large amounts of useful transfer whenever people have looked for it. Naturally enough, the amount observed depends on the methods of measuring (Gagné and others, 1948). In some of these reports the teachers were making a deliberate attempt to induce transfer. At other times, transfer seemed to occur with little deliberate effort.

Arithmetic In arithmetic it has been observed that children who practice only 110 of the 200 addition and subtraction couplets do about as well on the other 90 couplets as children who have practiced all 200 (Olander, 1931). Another similar experiment (Knight, 1924) dealt with the addition of fractions. Some 18 denominators between 2 and 30 were chosen for test purposes. One group of children practiced all 18 denominators. Another group practiced only 6 of these. Both groups did equally well on the final test using all 18 denominators.

Spelling In spelling we find that children who learn to spell "reflect" have also learned, with no additional practice, to spell "reflects," "reflected," and "reflecting." There is also some transfer between words less clearly related. Learning to spell "s*ear*ch" may help a pupil to spell "l*ear*n." English spelling being what it is, however, we must expect some interference along with the very considerable transfer. Although "s*ear*ch" may help with "l*ear*n," it makes for difficulties in spelling "j*our*ney." And although "reflected" may help with "reflect," "excelling" may hurt with "excel."

Fortunately there is even some transfer from the study of spelling rules (*i* before *e* except after *c*). Rules are especially useful when only a few simple rules are taught and when these do not have too many exceptions (Breed, 1937).

Foreign Languages At one time Latin was considered *the* foreign language. It was supposed to have tremendous transfer powers and was thought to induce almost all the intellectual virtues. Although these great hopes have not been borne out, it does appear that Latin can be used to increase a pupil's ability to spell and to read English words, and to help in the mastery of other languages. This transfer is more likely to occur if, during the study of Latin, pupils are deliberately encouraged to apply their new knowledge to aspects of other languages (Jordan, 1956, pp. 304–314).

Students who have taken several years of high school Latin or French get along better in college than students who have had no foreign language, or very little (Cook and Martinson, 1962; Skelton, 1957). The more recent investigators, of course, have been careful to secure groups of comparable intelligence, and

The Effects of Instruction Conducted in a Second Language

One class of 26 English-speaking children (Experimental Group) entering grade one in Montreal, Canada, were taught entirely in French. The children thought that French was the only language the teacher knew. They were compared to a similar group in the same school taught in English (English Control), and to a group of French-speaking children taught entirely in French (French Control). Children in all groups were selected to be roughly comparable in intelligence and home background. Final scores were statistically adjusted to make allowance for any differences that remained.

	Scores at the End of the Year			
	Experimental Group	*English Control*	*French Control*	*Difference Significant?*
Skill in reading English	36.5	58.6		Yes
Arithmetic concepts (tested in English)	55.2	54.9		No
General skill in speaking English	4.7	4.9		No
General skill in speaking French	1.8		4.4	Yes
Mathematics (tested in French)	16.7		16.8	No
Skill in reading French	15.6		15.7	No

SOURCE: W. E. Lambert and J. Macnamara, Some cognitive consequences of following a first grade curriculum in a second language, *Journal of Educational Psychology*, 1969, **60**(2), 86–96.

with such controls we find that the students who take French or Latin are significantly ahead of their intellectual peers who take no language in high school. The superiority is most marked in college languages but is also found in nonlinguistic subjects. Although this superiority could not be due to "tested" intelligence, it is possible, of course, that it is due to some of the qualities that induced the students to take languages in high school. Such things as academic-mindedness or parental pressure may have led students to take languages and may have also led to superior college grades. These possibilities should be considered before finally accepting the very plausible hypothesis that foreign language contributes valuable knowledge, skill, or habits of study (see Chapter 8).

Transfer from Principles and Rules

Often the feature that is similar in two tasks lies not in the similarity of the stimuli or in the similarity of the basic notions (capital of a country; largest city in a country), but in a common basic principle or rule (Hendrickson and Schroeder, 1941). Transfer is likely to be most effective when it is based on a grasp of common principles, or formulas, or rules. Naturally, we will get more transfer payoff from principles or rules that have many applications.

It is reassuring, but not surprising, to learn that it is in principles and meaningful generalizations that the great benefits from transfer are to be found. It is only common sense to suppose that the great universal truths, if thoroughly grasped, may enable a person to master many tasks for which he has had no formal courses nor any specific instruction whatever.

But there is a very worrisome catch in this reassuring truth. It is only those principles or formulas that are adequately grasped that are likely to prove useful in transfer. And the great universal principles are often quite difficult to master. For this reason we may get more transfer from a rather limited and inelegant rule which a pupil really grasps than from a much more complete principle that he can repeat but may not fully understand. In algebra we may get more transfer from the *mechanical rule* which says, "change the sign when you transpose," than from an ordinary understanding of the underlying theorem that when equals are subtracted from equals the remainders are equal. Over and over again, when working with average students, we get our most dependable transfer (Overman, 1930) from devices, rules of thumb, or from practical applications of principles. Figure 9.4, for instance, shows a graphic scale that you might use to help pupils grasp the time between events in American history. A pupil could readily transfer such a device to the study of ancient history or even to geology. Such transfer is also observed when a camper is learning to estimate distance across water. He learns that it is farther than it looks. He can now use this simple correction when he comes to estimate other distances over the water. The boy learning skeet shooting finds that he must "lead" the target. He can use this rule when he later shoots at ducks or enemy planes. In these illustrations, the principle involves a "constant error" (Gibson, 1953) that must be corrected, and this correction can be expressed in a fairly simple rule.

Specific strategies often reveal marked transfer powers. Students struggling with the problems of translating Latin or German may profit from such a mechanical strategy as "pick out the verb." Second-graders, trying to match cards on the basis of color, size, shape, etc., were helped by being urged to look *first* for color, *then* for size, and so forth. They were also helped by the quite mechanical strategy of discarding cards that had already failed in one match. Without this strategy they would put their useless cards back into the pack and needlessly go over them again. Strategies such as this, developed in a training task, proved useful when the pupil encountered new, but similar, problems (Wittrock, 1967).

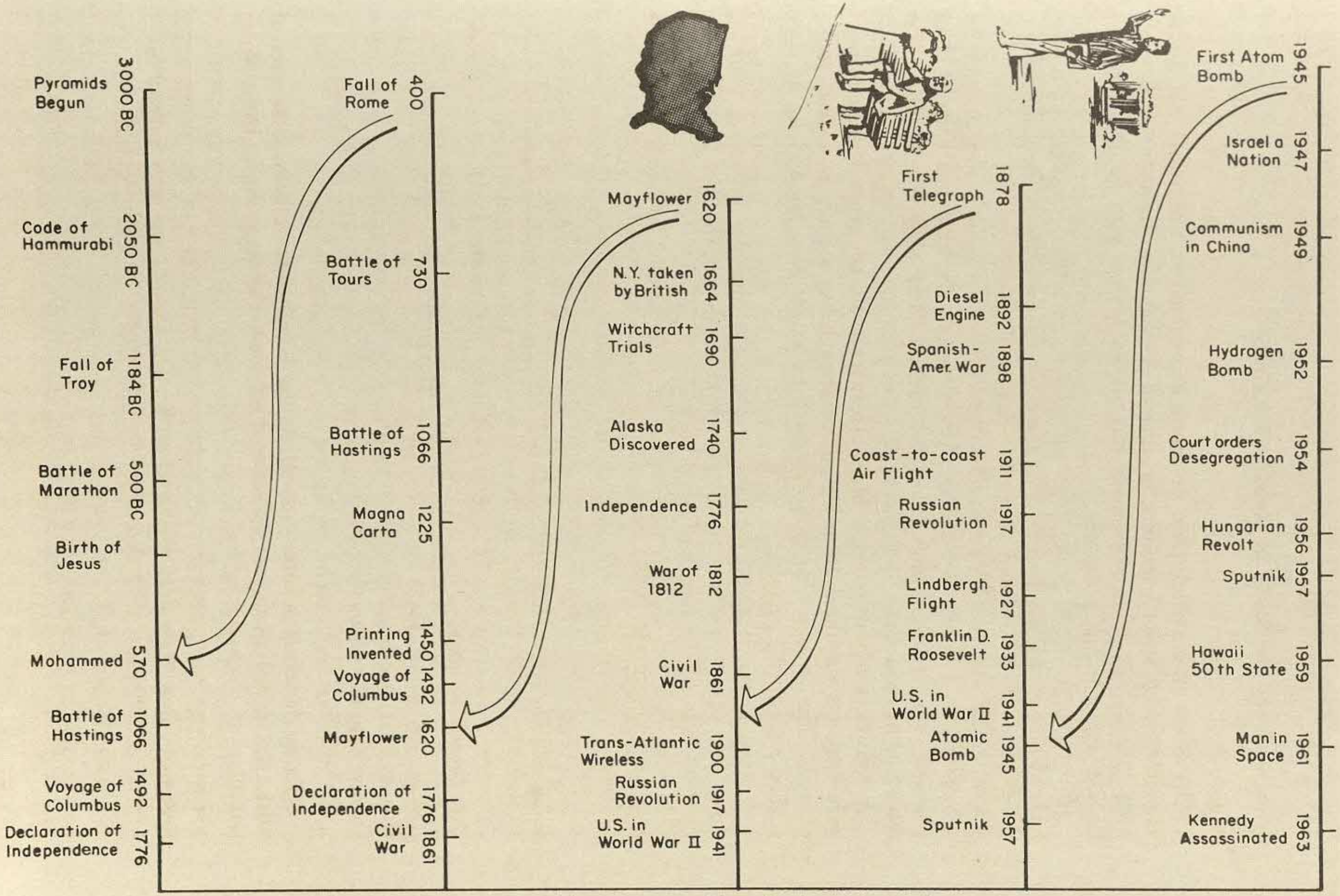

Figure 9.4. There is transfer value in time scales.

Transfer from the Study of General Principles

This study attempted to redo a classical experiment on transfer (C. H. Judd, The relation of special training to general intelligence, *Educational Review*, 1908, **36**, 28–42). This older study has played a great part in discussions of transfer for over half a century.

Three groups of 30 junior high school boys practiced shooting at a submerged target using an air rifle. The three groups were about the same age on the average (14 years) and about the same intelligence.

One group, the control, received no instruction but merely shot at a target submerged to a depth of 6 inches. After three consecutive hits each student changed to a target 2 inches below the surface. Here again the criterion was three hits in succession.

A second group received a brief explanation of the general principles of refraction, accompanied by a simple diagram using a rock in a lake as an example. The boys in this group studied the explanation for as long as they wished prior to the practice.

A third group received the same explanation plus the following working rule: "It is easy to see from the diagram that the deeper the lake is the farther the real rock will be from the image rock."

In each case the score is the number of trials needed to reach the first of three consecutive hits.

Help Given the Groups	*First Problem 6 Inches*	*Second Problem (Transfer Task) 2 Inches*	*Percent Gain*
Control—No Explanation	9.1	6.0	34
General Principles Only	8.5	5.3	36
General Principles plus Working Rule	7.7	4.6	40

The only significant difference was that in the second problem between the score of 6.0 for the control group, and the score of 4.6 for the group receiving both the explanation and the working rule.

SOURCE: G. Hendrickson and W. H. Schroeder, Transfer of training in learning to hit a submerged target, *Journal of Educational Psychology*, 1941, **32**, 205–213.

To provide dependable transfer, of course, the general principle or rule of thumb that is stressed in the training period must really hold when it is applied to the new task. Otherwise interference would be expected. Logan and Wodtke (1968) found that such interference occurred even when students were warned, during the original learning, that the rule of thumb would not work in all cases.

Making the Most of Transfer

To take advantage of automatic transfer, and to get the best results from deliberate attempts to promote it, there are a few rules and principles that should be remembered. We develop these as prescriptions. Some of these prescriptions or rules are practical recommendations based on principles already discussed. Others, mentioned for the first time, are derived from specific studies dealing with the rule or practice in question.

In using these rules or recommendations, it goes without saying that you must take into account the age and intellectual level of your students. Bright students in high school or college might readily transfer a highly abstract principle to a host of relevant problems, and might do so with little aid from you. Less mature students would need much guidance and might even then miss some opportunities for application. Dull or retarded students might have to settle for a practical approximation of the general principle and would need patient and detailed demonstration of the way in which it could be applied (Drew and Espeseth, 1968).

Presenting Similar Tasks in Close Succession Occasionally something studied now (*amicus*, "friend") may help in learning something else (*ami*, "friend") that is studied months or years from now. For the most part, however, such effects will be more powerful if the two tasks are experienced in close succession. Some of the factors involved are rather short-lived, and if we want to use them we should make sure that the two experiences occur close together (Underwood, 1961). One couplet ($3 \times 2 = 6$) is more likely to help another ($2 \times 3 = 6$) if the two occur close together. Whenever other conditions permit, we should try to promote transfer by making sure that the similar situations that call for similar treatment are experienced close together.

"Whenever other conditions permit"—this qualification is important. Other conditions may readily upset our rule. You will notice that, naturally enough, the rule for using transfer is precisely the opposite from the rule for avoiding interference. To avoid interference between two tasks we should separate the tasks. To use the positive transfer between tasks we should present them close together. What should we do when the two tasks have clear possibilities for both transfer and interference? Here it is wiser to try to prevent interference than to try to take advantage of the opportunities for mutual support. When both mutual support and mutual interference are likely, it would be better to space the practices.

The possibility of interference is not the only thing that may make it unwise to present similar things together. You have taught the students how to spell "manufacture." To take advantage of positive transfer you could now show how the similar sounding word "fracture" is also spelled with this ending. But you may be more concerned at the moment with other features of the word "manufacture." You may wish to stress its relation to "factory" or to "manual" and you may well decide that this latter structure, or meaning, is more important than the gains to be had from the more mechanical transfer.

Emphasizing the Similar Features in the Two Tasks Positive transfer is available when two similar situations call for the same response or approach. To take advantage of such transfer we must be sure that the pupil perceives the similarity in the situations (Fig. 9.5). Sometimes, of course, this is no problem whatever.

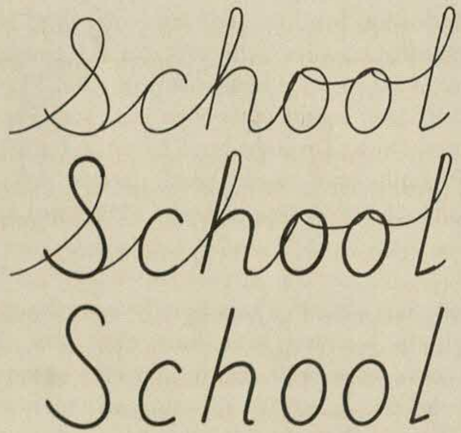

Figure 9.5. Bringing out similarities in the two tasks.

To the infant, the terrier is clearly similar to the spaniel as, indeed, is the cat. To many pupils 2 × 3 is hard to distinguish from 3 × 2. By the same token "was" is hard to distinguish from "saw." For some other stimuli, however, the similarity may not be so obvious, and in that case something should be done to bring it out. Often the latent similarity can be brought out quite simply, perhaps by placing the two stimuli close together house house or sometimes by a simple sweep of the pointer over two similar arrangements on a map. At other times the similar features can be stressed and the dissimilar elements played down, as in bringing out the common theme of two musical selections. By other arrangements of bold and subdued effects one could enhance the similarity between written and printed letters, or between comparable patterns of mountain, sea, and wind.

As the similarity between the stimuli becomes more and more obscure, more effort, of course, will be required to bring it out. We may have to go to a good deal of trouble to show that the altitude of a parallelogram is similar to the width of a rectangle, or to show that

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

is just another form of

$$r_{xy} = \frac{\Sigma xy}{N\sigma_x\sigma_y}$$

At some point or other we will have to decide whether the gains to be had from natural transfer will justify the effort required to bring out the similarity in the two stimuli.

Adequate Mastery of Training Task Typically the amount of transfer increases with the amount of practice in the training task. From some experiences in the training task ($5 + 4 = 9$), we can expect an improvement in a different performance task ($4 + 5 = 9$). With more experience in the training there will be even more transfer to the performance task.

Interestingly enough, extensive practice in the training task will prove beneficial even when we face the risk of negative transfer or interference. From his first experience with $5 + 4 = 9$, for instance, the child might be handicapped on his performance with $5 - 4 = 1$. With more extensive experience on the training task, however, this interference will typically diminish and may even come to produce positive transfer. Conceivably, as suggested earlier, the increased training helps encapsulate $5 + 4$ into its own proper structure (addition) and leaves it less free to go barging into some other domain (subtraction).

We should be especially careful to provide adequate mastery of the training material whenever that material takes the form of rules or principles. We can expect little useful transfer unless the principle itself is thoroughly grasped (Duncan, 1953).

Variety in the Training Task Most experiments suggest that there will be more transfer if the practice or training experience has been somewhat varied. A student, for instance, is getting practice on an automatic gearshift car in the hope of improving his performance in driving a car with a manual gearshift. Things would be better if, in this practice task, he could use a variety of cars, all having *automatic* shifts. In mastering the rule about the sum of the angles in a triangle, the student should acquire his experience with many different kinds of triangles. A rule acquired in this way should be more likely to transfer to future performance than a rule learned on the basis of only one or two examples.

Delay Between Training and Performance Ordinarily we need not worry if we are forced to wait some time after the training experience before we attempt the performance task. Even if the mastery of the training task itself has diminished somewhat, its transfer powers seem to suffer little with the passage of time (Ellis, 1969b).

Practice in Application to Performance Task Transfer, like other aspects of learning, can often be facilitated by specific guidance or prompting. After a student has learned a rule, or has become familiar with the training material, he should be shown, in specific fashion, just how it can be applied to a number of performance tasks (Ryan, 1968). Having developed the idea that, in adding, units must be added to units, tens to tens, and so forth, be sure to spend some time in guiding the pupils into the application of the principle—the importance of a straight right-hand column, for instance. If you must neglect either the exposition of the principle or the guided practice in application, slight the former. To follow our own advice, we should give more space in this text to these practical rules than to the earlier discussion of the general principle of transfer.

For most effective transfer, this guided practice should be given in a wide variety of fields. If you want the logic of geometry to have a wide transfer, give the student practice in using it in mystery stories, ethics, and puzzles. If you want him to make wide use of his ability in critical thinking, have him use it in the analysis of editorials, proposed reforms, or justifications for the status quo. By providing this specific guidance in applying his new skill to many problems, you at least show him that transfer is possible.

Developing a Set Toward Transfer One of the gains to be had from specific exercises in the application of newly developed skill may come from the development of a *set* toward transfer. You may alert the student to the general possibilities of applying the results of his training, and such a set may be the key to effective transfer. Being capable of using the new skill is not enough. The student must also be on the lookout for chances to use it. To develop a set of this sort, we should present him with problems in which the principle is useful, but in which its application is less and less apparent. Whenever he attempts to make sensible use of the principle, commend him. If he fails to use it, point the way to its use, and give him an opportunity to use it again on his own.

Much of the discussion of *discovery learning* (Chapter 7) has revolved around this matter of developing a set toward transfer. In several experiments, the use of discovery learning has not led to any apparent advantage in the mastery of the principle itself, but this procedure has produced more effective transfer when new problems are encountered.

At times the principle being taught is to be used chiefly for its transfer value. You may not care whether the student has an elegant or precise comprehension of the principle, but you are most anxious that he can use some version of the principle—crude or precise—in his dealings with some other performance task. Under these circumstances there should be much to be said for discovery learning. You might be wise, for instance, to provide a plentiful supply of examples and then let the pupils, on their own, work out the rule that winds blow clockwise around a meteorological high, or work out rules about the polarity of an electrical helix, or about Congressional elections in midterm, or the sequence of *i* and *e* in English spelling. Don't expect these rules to be as complete or elegant as those found in the textbooks. Be sure they are not in error, but if you are chiefly concerned about transfer, tolerate a little awkwardness. An awkward rule that the pupil grasps will have more transfer effect than a more elegant rule not so well understood. Naturally, if your main concern is not transfer but a grasp of the more elegant principle itself, the procedure would be different.

To be sure of a thorough grasp of the rule or principle on the part of as many students as possible, you may have to settle for a more limited, concrete version of the principle, and give up your hopes for the more general and more abstract form of the principle. You may have to settle for "*i* before *e* except after *c*," and give up your hopes of deriving the rule from basic etymology.

Relying on Transfer: Yes and No

It is assumed that we will make much use of transfer. We will use a certain amount whether we intend to or not. By taking a few pains we can use much more. But there are still some questions left. When we have a choice, for instance, should we always arrange for direct practice? Or are there times when transfer might be preferable?

Often, of course, we have no choice. Direct practice is not always available. We cannot provide direct practice in the use of an electronic computer as yet unbuilt to solve problems that have not yet been stated. And yet we may wish to have some competence developed by the time the machine is available or as soon as the problems are set. There are other times when the deliberate provision of direct practice is almost unthinkable. We are unlikely to bring ourselves to provide practice for children in dealing with intense grief or the full fury of an atomic attack. We would be reluctant to let the young surgeon do his first practicing on the live human being. For such early practice we might wish him to use cadavers or animals, hoping that a considerable amount of transfer will have occurred before he operates on his first patient.

To Avoid Costly Practice Even when direct practice is possible and is morally justifiable, it may turn out to be enormously expensive. In estimating this cost we should consider the time during which the machines or facilities have been diverted from production and used for training. We must consider the time of instructors, the cost of materials used up, and the risk of damage to the machine, to the student, or to other people (Lawrence, 1954). At times it may pay us to have the student practice in a less costly situation and hope that there will be considerable transfer. Students needing skill in woodworking, for instance, can acquire some proficiency by working with less costly cardboard (Crofton, 1957). Through his practice in the less costly situation he may be able to start off on the more expensive materials or equipment with a higher level of skill. Or, even better, he may be able to master the more costly machine at a more rapid rate.

To Secure Valuable Concomitants Even when the total cost of transfer is clearly greater than that of direct practice, and even when direct practice is feasible, we may prefer to rely on transfer for the sake of some concomitants not considered likely in the direct practice. Latin may be more costly than direct practice in inducing a mastery of English. In the minds of some people, however, this greater cost may be offset by the intrinsic familiarity with Latin to be had from the indirect practice, or by the feeling of kinship with other educated people. In the final assessment of the claims of transfer versus direct practice, we must also keep in mind the possibility that the attitudes or general approaches induced by the more expensive transfer may persist longer than those generated by direct practice (Woodworth and Schlosberg, 1954).

To Hasten Reinforcement We may find it wise to rely on transfer rather than direct practice whenever the ultimate task is so very difficult that the student could expect no success whatever from direct practice (Baker and Osgood, 1954; Lawrence and Goodwin, 1954). A beginner plunged into the real business of wine testing, for instance, might never make a single correct judgment. Similarly, a rank beginner starting to operate a complicated power shovel on a fixed time schedule, might never load a single truck. In these cases there would be none of the intrinsic success or reinforcement so important in learning. For this reason direct practice might be almost useless.

Whenever direct practice is likely to lead to very little initial success, we might well use other tasks and base our hopes on transfer. This can be done in two different ways. First, we could simply use an easier version of the basic task. If a student is hoping to take shorthand at a rapid rate, we could have him practice for a time at a slower rate. During this easier practice a reasonable amount of success and reinforcement could be expected. The final gain from such a modified task would be much greater than the gain from practice on the more formidable genuine task (Lawrence and Goodwin, 1954). This is one instance in which we may gain more from transfer than from direct practice.

As a second substitute for practice on an extremely formidable task, we could have our student practice on separate features of the more complex task. This

The Best Way To Learn Something Is To Teach It To Someone Else

Working under different conditions, groups of 15 college students each learned to associate pairs of common English words. There were 12 such pairs to a list, and each student memorized several lists. All groups learned 4 lists, being tested for each list. Following the learning of these 4 lists, each of the members of one group (Teach Other) helped another student while learning 4 more lists. Members of a second group (Learning) themselves learned 4 more lists. Members of a third group (Rest) merely rested during this period. During a final period members of all groups learned a third set of 4 lists.

Average Score on First Set of Lists	*Intervening Activity*	*Average Score on Final Set of Lists*
15.3	Teach another student	21.1
15.8	Learn four more Lists	15.4
14.7	Rest	15.4

SOURCE: K. Kilby Long, Transfer from teaching to learning, *Journal of Educational Psychology*, 1971, 62(2), 167–178.

same superiority of transfer, by the way, has been reported in other activities. A college student may learn more from teaching a list of words to someone else than from the direct study of the list (Long, 1971). Here, of course, the advantage may come from the additional activation, or motivation, or increased effort, and not from the mechanical differences in the two training tasks.

If the complex task of driving a car is too much for the student, he could get some value from the separate practice of such things as braking, steering, accelerating. Practice on even one of these components will frequently transfer to the complete task. Indeed, if we have little time for practice, it would be better to select one key component, say, braking, and give much practice in that than it would be to spread our time over a number of components (Eckstrand and Wickens, 1954).

The Advantages of Direct Practice As we have seen, there are times when performance on a given task will be aided more by transfer than by practice on the task itself. But this is not typically the case. Ordinarily we would do better to use direct practice whenever it is available, safe, not too expensive, when it provides the desired concomitants, and when it permits a reasonable amount of success in the early stages. To illustrate the last of these conditions, let us suppose that a boy should be able to drive a gearshift car as well as a car with an automatic shift. Should we start him out directly with the gearshift? Or should we let him use the automatic shift at the outset? If the gearshift car permits a reasonable amount of early success, we would do better to have him work with this from the start. The skill he acquires in this more complex task should transfer almost completely to the simpler task (Day, 1956; Holding, 1962). After mastering the automatic shift, however, he would still have much to learn in handling the gearshift. If, however, we could expect little or no early success with the gearshift car, we would get more overall transfer from initial practice with the automatic transmission.

Rules for Effective Study

To be sure of a reasonable amount of transfer, we should not stop with general principles. We should translate these into specific rules or applications. To follow this rule, we try to work out a few highly concrete rules which embody the general principles discussed in the previous chapters. These take the form of rules for effective study—rules that you may find useful in your own study and that you can use to provide the help your students will so often need. We do not want to overdo this matter and thus transfer ourselves or our students into mechanical automatons (Maddox, 1963). But we might systematize the matter somewhat.

There is certainly a great need for help in this process of studying. When students have had no special instruction in the process, they seldom get more than half of what they read (Morgan and Deese, 1957). Even a second reading adds only slightly to the yield. Most students, on the other hand, improve somewhat after getting systematic help on methods of study (Entwisle, 1960). The more complete treatments of this topic, of course, cover many special features such as effective use of the dictionary and of the library, skill in reading graphs, in taking notes, and in the general arrangement of study conditions. You might do well to get one of the books that offer help in these matters and give it careful attention (Morgan and Deese, 1957; Robinson, 1962; Tussing, 1962). Meanwhile, here are a few rules that come from our study of the learning process.

1. *After a brief familiarization, adopt an active role.* In studying very complex or formidable material, you might profit, for a time, from the exposure learning that works for the young infant. You might look over the text in a leisurely, nonanxious fashion, merely asking yourself, "What is this all about?" But don't indulge yourself in this manner for too long a time. Serious study is not the simple process of letting your eyes wander over the printed page—as you might do while perusing a magazine in a doctor's waiting room. It is more like the directed effort you feel when trying to get to your friend's house and, fearing that you are lost, you reread the letter that sets forth the directions. In the latter

case, the level of activation may be a bit too high, but for the most part, study should be more like this active search for information and less like casual browsing.

2. *Set specific immediate goals.* Your general motivation is probably fairly high. You want to succeed in college or to get a good grade on this course. But these goals are rather remote and general. They are not as immediate as the need of the motorist to get to his destination. Divide your long-term goals into small units—to master a certain number of pages each week, to finish Chapter 12 tonight.

3. *Get an early grasp of the general structure* (*SURVEY*). Try to understand the general pattern of what you are reading. When starting a book, look over the Table of Contents and see if you can get a picture of the overall pattern of what is covered. When about to read a chapter or part of a chapter, study the headings of each section. Try to organize the different headings into a group. Try to guess the general pattern of what will be said.

Naturally enough, you should try to work out some structure that makes genuine sense. If the material is too strange or novel, however, you may not find a very meaningful structure from the headings alone. In that case, an arbitrary structure (for example, beginning, rise, and fall) should be better than nothing.

4. *Devise questions to be answered* (*QUESTIONS*). Our lost motorist had a very definite question to answer. He was actively reading with a purpose in mind. To develop such a set in yourself, try to phrase questions that you could answer from the material being studied. The easiest, routine way to do this is to turn the heading of each section into a question. If the heading says, "Origins of Children's Needs," you could turn this around and say, "What are the origins of children's needs?" Now READ the section, trying to get answers to your question.

After you have read the section you may find that the question you first formed out of the heading is not a very appropriate question. In that case you might well try to work out a new and better question. Write this down, either in the book itself or in a notebook you keep for this purpose. If you use a notebook, be sure to note the page in the text to which the question belongs. The very effort of trying to phrase a new question may help you turn the section into a new and better structure. The very act of phrasing the question should help even if you do nothing further with it—but, of course, you should do something further with it.

5. *Answer the questions* (*RECITE*). Here we urge you to give up the comfort of guidance and to plunge into the uncongenial trial-and-error stage of learning. With the text covered, try to answer the questions you have phrased, and then jot down a few *cues* or *key phrases* to remind you of the answers. Write them clearly and arrange them systematically, but don't try to make them complete. Keep them brief and in the form of cues that will bring the complete answer to your mind when you look at them later. After you have written down

the cues, check to be sure that they suggest the right answers. If they do, enjoy the reinforcement you get. If not, absorb the guidance you got by looking, then cover the book and try again. Check over your notes or cues to see if they need to be corrected.

6. *Review.* After you have gone over a few sections in the way suggested, go back over the whole group, recalling the questions, if convenient, or looking at the questions, if necessary, and for each question, try to recall all the answers you can. Whenever you seem to draw a blank, keep trying to recall for a few moments and then, if you are still stuck, look at the cues you have written in your notes.

Repeat this REVIEW for larger and larger units as often as you can find the willpower to do so.

The words in full capitals in the previous sections are the key words of Professor Robinson's (1962) well-known system of study. People often refer to the system as SQ3R. This may serve as a convenient cue or mnemonic device to help remember the rules.

7. *Practice even where understanding is incomplete.* By all means seek out the meaning in your new material. Try to see the general process and the rationale underlying the task you are about to attempt. Get a general picture of the dancing steps you are to learn, of the words you are about to pronounce, of the problems you are to solve. But do not insist on perfect understanding before you begin to practice. Get a reasonable amount of familiarization. Then plunge in. If you are learning to dance, get up on the floor and try to dance. If you are studying mathematics, start doing the exercises even though you do not understand everything the text says. Understanding often follows manipulation. In writing an English exercise, do not wait for the muse to visit you with a perfect theme. Start to write. At first you will probably write rubbish, but it may get you into the swing of writing, and anyway, you may be able to salvage something from it when you correct it later on, as, of course, you must. People who insist on a perfectly complete understanding of the underlying reason before they make a single move often fail to make that first move.

8. *Handle distractions systematically.* Do not use up too much time or energy in trying to overcome distractions by sheer willpower. Physical distractions may often be avoided altogether. Try to find a place where you do not hear other conversations, speeches, or plays from the radio or television. Casual music probably will not bother you a great deal. Neither should meaningless noise unless it is too intense or unpleasant.

It is not only with physical distractions that you will have to contend. Most people probably lose more time through the intrusion of their own irrelevant ideas than from outside physical distractions. There is no single method for handling these internal distractions. One psychologist used this system: whenever he found an irrelevant idea cropping up with bothersome frequency, he used to jot it down in a "commonplace book" he left on his desk. If, while marking papers, for instance, he found his mind occupied with ideas for constructing a new piece of apparatus, he would make a brief sketch in the notebook. Even more frivolous, persistent ideas would be dealt with in this same way. He might write down, "Tell Bill story about . . . ," or "Dean . . . had no business making me take over that extra section," or, "Try to make up to Mary for the dirty crack I made about her hair-do." His theory, of course, followed something of a Freudian trend. He believed that any idea which kept bobbing up must have had some powerful drive behind it. Suppressing a powerful drive will, of course, be difficult. By writing it down, he promises, in a sense, to give it due attention later on.

Summary

In helping a student with one task, we are exceedingly likely to affect his mastery of some other task. The net result may be facilitation or interference. Facilitation is likely to appear when the two tasks have similar stimuli and identical responses. Interference may result when the stimuli are similar but the response different. Here, however, there are exceptions. Neither facilitation nor interference is likely in well-structured material or in tasks that have markedly different stimuli.

To combat interference we can try to embed the two tasks in some structure or structures, or we can space the practices in which the similar stimuli occur.

Forgetting is largely a result of interference between tasks. In some school subjects much of the material learned may be forgotten over the summer or in a year or so. In other subjects most of the material is retained. Things that cannot be retrieved by outright recall may be detected by a more sensitive test. There may be two separate memories—a short-term holding memory serving as a transient copy, and a long-term memory in which material is reorganized and filed. Much that is forgotten can be rapidly relearned. Structure aids retention. So does high motivation during learning. Overlearning will help, and so will frequent review.

Positive transfer is one form of facilitation. Although transfer cannot produce miracles, it can greatly add to the total contribution of the school. Within many subjects automatic transfer makes it unnecessary to teach every single item. There appears to be substantial transfer from high school experience to college attainment. From many kinds of learning we may learn how to learn.

To take advantage of transfer, we should present similar tasks in close succession, bringing out the similarity. If several tasks can be seen as part of one principle, the knowledge of the principle should aid in those tasks. There may be more payoff from a well-understood working rule than from a more elusive principle. In any case, there should be much varied practice in applying the principle.

Transfer is often, but not always, a second best. At times, however, it may be better than direct practice when that practice is dangerous, costly, or offers little early reinforcement. The substitute for the direct practice (transfer task) may also have something of value in itself.

It is difficult to decide whether to plunge into a complicated task or to begin with an easier version. Probably the former is better whenever there is a reasonable certainty of early reinforcement.

From knowledge of efficiency we can work out rules for effective study. These rules call for *active* studying, the use of *specific* goals, the search for *structure*, the *devising* of questions on the material, the *answering* of these questions, and a program of *review*. They also urge the student not to be too desperately concerned about distractions, his own sensitive ego, or even these rules.

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10

Estimating Aptitude and Success

This chapter concentrates on the measurement and evaluation of the intellectual and academic areas already treated in Chapters 5 through 9. In these areas, the teacher constantly faces the problem of measurement, and in these areas the teacher is the chief day-by-day manager of the testing process. Tests covering the important areas of character, socialization, and personal well-being are discussed incidentally at various points in Part III. These later incidental treatments, it will be seen, provide only moderate detail. Testing in these areas is a less intrinsic responsibility of the teacher, much of it being conducted by counselors, or school psychologists, or by people with similar specialized training.

Measurement in some form permeates virtually every facet of daily living. In scheduling our daily affairs and economic transactions, for example, we constantly use measures of time and money. In sporting events, we see batting averages, yards gained, and golf handicaps set forth with remarkable precision. Many important occupations—engineering, medicine, and manufacturing—call for extremely critical measurement at every turn. It is true that in some activities—painting a room or shoveling off a walk—a simple glance will tell us how far we have progressed. But this is not true in teaching. Like the ocean navigator, the teacher must make careful measurements before he can know where he stands in relation to his objectives. Many of his objectives, moreover, are complex and difficult to measure. Not surprisingly, then, the general problem of measurement in education has received a tremendous amount of attention. In this chapter we highlight some major concepts, problems, and issues associated with educational measurements and their uses.

Measuring and Evaluating

Both measurement and evaluation are involved in most testing programs, and it is sometimes difficult to decide just where one leaves off and the other begins. *Measurement* refers to the things you must do to get a numerical score for a pupil. You can get one kind of score by putting him on a weighing scale. You can also get a score by giving him a test and then marking it. At this point you get a numerical score. You can say, "He weighs 62 pounds," or "He got sixteen items right in the arithmetic test." But we seldom stop with just getting a score. Upon hearing these numbers, we ask, "Is that good?" or we automatically feel approval or dismay. At a more elaborate level, we make formal judgments on whether or not this score is good enough. Such feelings, or such judgments of worth, or "value," constitute the process of *evaluation*. Some touch of evaluation is usually present whenever teachers consider test scores. Such evaluations often lead to a deliberate *decision* about what should be done, or about policies that should be adopted. Upon obtaining a score (measurement) and feeling that it is too low (evaluation) we might decide to repeat the examination, to reteach the unit, or to revise the curriculum.

Classroom Uses of Measurement

Some of the decisions calling for measurement have to do with the routine tasks of instruction. To adjust our teaching to the class, or to the individual, we may wish to know something about the abilities and interests of those to be taught, and we may also wish to determine the present standing of the class or the student. Perhaps the whole class has already mastered what we had planned to teach. Perhaps some students have a partial mastery and others very little. This initial status (or entering behavior) should affect our plans. To be able to take these things into account, we must do something in the way of measurement.

When instruction is in progress, measurement provides useful feedback. Seeing his score on a test, the student can see where he has progressed, and where he has been less successful. Even if matters are left at that, such information may provide motivation (Chapter 5). Often, however, this feedback can also provide some cue to the need for a new approach, or a new line of attack. Diagnostic tests may pinpoint the difficulty. More general test results could lead the student to seek guidance.

Guidance versus Final Judgment This process of using tests to show us where we stand and to point the way to a new approach has been called *formative evaluation* (Scriven, 1967). This has been contrasted with *summative evaluation*, in which we merely try to summarize what has already happened.

Recently there has been much controversy regarding the value of summative evaluation. At times it seems to serve no other purpose than that of permitting us to pass moral judgment on the pupil. Looking at this record of the unalterable past, we can say, "Well done," or "Shame on you." But what is to be gained from judgments left in this form? And if nothing is to be gained, what right do we have to violate the student's privacy and expose him to possible humiliation?

But notice the important "if." *If*, or *when*, nothing is to be gained, then we should certainly hesitate to indulge our inclinations to applaud or condemn. Many times, however, there is something to be gained from tests that merely summarize what has already occurred. The student may well profit from this additional knowledge of himself (Manning, 1969; Bloom, 1969). He might be able to make better use of this information, by the way, if the evaluation or judgmental aspect is played down, and if the objective facts receive the stress.

In considering these matters, we must realize that the terms "formative" and "summative" are relative. The final examination may be summative as far as this year is concerned, or as far as high school is concerned. The results could be formative, however, in helping a student decide whether from now on he should major in languages or in science. They are also formative in the grim business of deciding who will go on to college, who will get a scholarship, or license, or job. Finally, results that are summative from the point of view of the teacher or the school may be formative for the system as a whole, or for governmental agencies. Results that come in too late to help the individual child may still be useful in helping his younger cousin, or in improving educational systems still to be devised.

Measurement for the Administrator and Scientist

For the administrator concerned with policy and curriculum, and for the scientist attempting to set forth the principles of instruction, educational measurement plays a vital part. Only through an elaborate program of formative evaluation can a curriculum be developed. One aspect after another is tested and those test results are used in deciding on alterations or extensions. And only by dependable summative tests can we find out if the curriculum has had any demonstrated effect on the pupils involved (Provus, 1969; Wiley, 1968).

There may be some question, by the way, of whether we must always ask for demonstrated effectiveness before we can justify a curriculum or other school experience (Westbury, 1970). Most school experience involves a sustained association between adult and children. This association, like that between husband and wife, or parent and child, probably derives from a strong primitive need (Stephens, 1967). Typically, like the other intimate human associations, the teacher-child association produces some important effects. But, again like the other associations, this classroom association may also meet important needs for both teacher and pupil apart from the measurable effects. Some of the actual outcomes, moreover, may be subtle and, being hard to specify in advance, they may fail to come through our tests. It is interesting that many of Jackson's (1968, pp. 123–126) outstanding teachers tended to dismiss testing as unimportant, if not an actual hindrance. Many of these teachers, as previously noted (Chapter 1), regarded teaching as a vivid and important form of self-expression. To them, as to the warmhearted parent, lively association with children may seem a justifiable goal in itself. To the general public, however, this eager exchange, delightful as it is, may not seem enough. Most people will feel happier about any classroom arrangement when it is not only pleasant to contemplate but proved to be effective (Sullivan, 1969).

Theories of the teaching process, like many other theories (Chapter 4), are closely linked to data. Many such theories actually arise from educational data. And, typically, they are tested by their agreement with the data. The most precise and dependable data come from the use of tests or measuring devices. And almost any scientific investigation must make use of such devices. Often the testing of an important theory hinges on the possibility of developing suitable tests.

Along with his other obligations, the administrator must honor the public need to know about the system it maintains at such cost. At times, as pointed out earlier, the needed information may be used for future reform. At other times it may be required merely to settle a nagging worry. This worry may become acute when we suspect that we are being outdistanced by the Russians or by some other country (Husén, 1967), but even without this stimulus we frequently launch surveys to determine the work the schools may be accomplishing. One of the most elaborate of these is the National Assessment Program (Tyler, R. W., 1966). Following a complex sampling pattern, the program will measure attainment in many subjects and will repeat these measurements over the years. Although intended primarily to survey general achievement in the nation as a whole, the program will permit comparisons by area, community, sex, social status, and race (Mehrens, 1969).

Cost-Benefit Analysis Recently there have been proposals (Sjogren, 1970; Thomas, 1969) to use test results in an elaborate cost-benefit analysis. In this procedure there would be an attempt to see just how much a certain degree of achievement in one subject (say, algebra) would cost in terms of teaching time, teacher preparation, plant use, and so forth. There would be similar analyses of the cost of attaining specified degrees of achievement in history and typing. This general procedure, of course, will seem sensible to some people, and fill others with dismay. Avoiding these larger issues, we merely point out that such an arrangement would call for testing programs that are exceedingly elaborate and dependable.

The Teacher's Responsibility for Evaluation

For the less formal aspects of testing, the teacher has almost complete responsibility. Typically, the frequent "quizzes," and even some of the more elaborate examinations, are prepared by and marked by the teacher. He is also responsible for any evaluations or interpretations of these tests that may be sent on to parents.

The more formal, systemwide testing programs, of course, are usually managed by some central office. In these larger programs some form of standardized test is often used, and these tend to be quite technical. They are selected and administered by psychometrists or by someone especially trained in the procedures of testing. Such specialists ordinarily have chief responsibility for the tests of intelligence, aptitudes, interests, and for broad surveys of achievement such as may be given every two or three years.

Although the teacher has less immediate responsibility for the more formal, systemwide tests, he will often be asked to assist, perhaps by helping to give the tests, perhaps in other ways. In providing this help, it would be useful to know something about tests and testing. Ordinarily, moreover, the teacher will be expected to make use of the test results. To do this in intelligent fashion, he should have a clear understanding of the tests being used—their purpose, strengths, and limitations, and the principles on which they are based.

This chapter should provide a brief overview of measurement and its problems. So crucial is the matter of measurement and evaluation, however, and so involved are the procedures, that you should undertake further and more systematic study in these fields. Such study is often more meaningful after some experience in teaching, and after increased familiarity with the subjects to be taught.

Some Basic Concepts of Measurement

Most of the discussion has to do with the more familiar educational tests—standardized tests, teacher-made tests, and tests of abilities and of special aptitudes. The general principles, however, apply to other means of making educational observations, including direct classroom observation, rating scales, and checklists.

Task Requirements versus Relative Standing

There are at least two approaches for evaluating or judging a student's performance on a test. In driver education, for instance, we could decide that to succeed in this test the student must be able to park his car within 6 inches of the curb, between two other cars so many feet apart, and be allowed so many minutes, or so many gear changes. In this kind of test we do not ask where the pupil stands in relation to other students. Each person is measured against an objective *criterion*. Everyone in the class could pass. There is no predetermined number of passes or failures. Measurements made with such a criterion in mind may be called *criterion-referenced*. Such criterion-referenced measurements are very frequently used in athletics, in typing, or in vocational classes.

In academic subjects it is sometimes difficult to decide just how much competence is really necessary. Just how much, for instance, should a student appreciate Shakespeare in order to get by? When it is difficult to justify absolute standards, we are inclined to give meaning to our measurements by referring them to the performance of some group that people can visualize. We can say, "Your score is about the average of college freshmen," or, "You excelled 75 percent of your class." Such group *norms* are typically used when we need to give meaning to scores on intelligence tests and standardized tests of achievement. They are also used in teacher-made tests whenever the instructor "marks on the curve." Measurements interpreted this way have been called *norm-referenced.*

Both kinds of measurements are useful. At times you say, with some conviction, "To be proficient in this area, each pupil must be able to spell so many words, detect the following fallacies, or perform the following experiments." When this is true, it would seem wise to test each pupil with these criteria in mind and to forget about his relative standing. At other times, however, you may not be able to set hard-and-fast criteria with any genuine conviction, and yet you may wish to have some means of judging the acceptability of a performance. Here, you may find yourself relying on the pupil's standing in reference to some group.

We must not imply that measurements based on norms are always a second best. At times it may not be enough to know that all of these fifty students have met the basic criteria. You may want to know whether one excelled the other and by how much. This happens when a limited number of jobs are to be filled or when prizes are to be awarded.

It will have occurred to you, by the way, that even the criterion-referenced tests are probably influenced by group norms. The people who set different criteria are undoubtedly influenced by what they think people can do. No one would set a standard—in parking, for instance—that could be met by only one person in 10 million.

Validity of Measurements

In selecting or constructing a test, you will naturally wonder whether or not it measures what you want to measure. This is the problem of *validity*. Those engaged in test construction go to a great deal of trouble to work out ways for deciding just how much validity a test may have (Thorndike and Hagen, 1961).

Content Validity Especially when testing achievement, you can get some idea of the validity of a test merely by carefully examining its content and comparing that content with the things you want to test. If you have a clear idea of the objectives of your course, you will obviously try to be sure to include those items in any test that you construct. Similarly, in examining a standard test already constructed, you would try to see if the items in the test seemed to cover the things you have in mind. If you wish to measure skill in solving mathematical problems, for instance, you would be dubious about a test if you found that its items dealt mostly with the manipulation of numbers.

Obviously a test may have content validity for one teacher but not for another. If you are interested chiefly in problem solving, you may welcome a test in which the numerical computations involved are exceedingly easy, and you may regard this test as valid for your purposes. Another teacher, however, or you yourself at a different time, may be looking for a test that will determine skill in numerical computation. If the test is limited to easy items of computation, it would not be valid for this objective (Loree, 1965).

Predictive Validity Often we give a test to find out if a student is ready for some new course, or to estimate how well he will do in the course. Tests used for this purpose should have *predictive validity*. The scores they provide should give an accurate estimate or prediction of the student's subsequent performance.

In contrast to content validity, predictive validity cannot be determined by general inspection or common sense. From common sense, for example, you might expect that ability to drive a car might be good prediction of subsequent ability to fly an airplane. But things don't always work that way. To determine predictive ability you need a *pragmatic test*. The test to be examined is given to a preliminary, experimental group. This group then undertakes the essential task that you have in mind. Later you find whether or not the people who did well on the test being considered also got along well on the task itself. If so, the test has predictive ability. This holds whether or not anyone can explain *why* such a test should predict ability to master the task in question. You are satisfied if it works. Seeing how well it predicts the performance of the experimental group of students, you have some idea how it will predict the performance of a new group.

Predictive validity, of course, is not just something that a test has or has not. It is always a matter of degree. The predictive ability of a test is described by the *correlation* (see the Appendix, pp. 648–658) between performance on that test and later performance on the real task. Theoretically, with perfectly reliable tests (see below), that correlation could range from 0.00 (no predictive validity) to 1.00 (perfect validity). In practice, such validity coefficients may range from the high .80's down close to zero.

Since no coefficient of predictive validity ever reaches 1.00, we must accept the fact that our predictions are inevitably imprecise. Short-term predictions, naturally enough, are more accurate than those made for the distant future. An aptitude test given in grade 4 may have a predictive validity of .70, or so, for performance in grade 5. This grade 4 test, however, will be much less dependable for predicting performance in college. But even the most valid tests will be far from perfect. We can never hope to predict just exactly where each grade 5 student will stand. Fortunately, as it happens, such precise predictions are seldom needed.

When trying to select a standardized test, you will usually find that the accompanying manual gives you the predictive validity that you can expect in various circumstances. In looking at these coefficients of predictive validity, by the way, you will be wise not to make overly fine distinctions. Suppose, for example, one test correlates .50 with tenth grade algebra when the latter is measured by teacher's grades. A second test correlates .55 with standard test scores in the same subject. It is entirely possible that the first test may actually have higher general predictive power for algebra. In this case, the lower correlation may come from the greater unreliability of the teacher's grades. Even a "perfect test" could not obtain consistent agreement with a standard if that standard itself fluctuated wildly. Still other technical considerations enter in, and unless one studies these in detail, decisions about tests should probably not be based solely on slight differences in validity coefficients.

Finally, greater confidence may be placed in a high validity coefficient if the experimental group on which it was based is similar to one's own student population. Otherwise there would be some risk that results based on a radically different group would not hold for the group we have in mind.

Reliability of Measurements

Error is a problem in all measurement. Ten people measuring the length of a book in millimeters would come up with a wide range of answers. In educational measurements this inconsistency or *unreliability* is a serious problem, and much effort has been expended to reduce it or find ways of dealing with it.

To check on the reliability of measures of such physical things as height or weight, the simplest procedure is to repeat the test. There should be a high correlation between the score the pupils get on the two applications of the same test. Such a correlation for weight might easily be .98 or .99 (1.00 being perfect). When an educational test is repeated, however, the problem may be complicated by the fact that the pupils may actually remember some of the answers they gave on the first test.

A second method for determining test reliability involves correlating the scores of *two forms* of the same test. Equivalent forms of a test are often prepared, and, in determining reliability, both forms are given to the same students. A coefficient obtained by correlating these two forms provides an index of test reliability known as a *coefficient of equivalence*. Again, the larger the coefficient the more reliable the test.

When it is impossible, or inconvenient, to use two forms of a test, we can use a coefficient of *internal consistency* as an approximation to the coefficient of equivalence. To obtain such a coefficient, we can "split" a given test in half, determine the scores for each student on each half, and correlate the two sets of scores. The student who does well on one "half" should also do well on the other. This "splitting" can be done by utilizing all odd-numbered test items for one half and all the even items for the other half, or by more elaborate procedures. Both halves must be composed of the same types of items, however, if this computational procedure is to be legitimate. Frequently the *internal consistency* method is the only practical alternative open to classroom teachers concerned with the coefficient of reliability of the homemade tests. And shortcut methods for such computation are available (Diederich, 1960).

When a test is shown to have low reliability, several things can be done to improve the situation. The items in the test can be worded more carefully so as to reduce ambiguity. Typically there will be some gain from merely adding more items, even though, individually, the added items are no better than those already used. This is one situation in which "more" is "better." Through such a program of improving and rechecking, at the hands of the experts, a standardized test of intelligence can be made to yield a coefficient of .92 or .93. This is impressive but is much less than the reliability of a good weighing scale or of other measures used in the physical sciences.

Dealing with Lack of Reliability Even after the most careful treatment, any measurement will have some error left within it. We must reconcile ourselves to this fact and try to find ways of dealing with it. Most published tests of achievement, or aptitude, will be accompanied by some statement of reliability. This may take the form of *standard error of estimate*, and this is an excellent device for helping us to interpret test scores without attaching unrealistic precision to them. The standard error of estimate deals with the *range* of errors to be found in a group of estimates. Suppose, for example, that several people, using rough-and-ready procedures, are estimating the height of a distant mountain. Compared to the true height, most of these estimates will be found to be in error—some estimates being too large, some too small. The standard error of measurement gives us the limits *within which* two-thirds of the errors will fall. If the standard error of estimate is 200 feet, for instance, this would mean that *two-thirds* of all the estimates were within 200 feet of the true height, some estimates being 200 feet too high and some being the same distance too low. The two-thirds part, of course, is quite arbitrary. We could just as well have used a number that would include one-half of all the errors, or three-quarters, or any other fraction. For mathematical reasons, two-thirds has happened to be a convenient proportion to talk about.

Notice that the standard error of estimate does not include all the errors, but only a fraction of them. There is no good way of setting the limits that would include all the possible errors that could occur.

The Inevitability of Error

There might be some temptation to dream of the scientist's world as being beautifully precise and conveniently purged of all error. Actually, even in the most precise fields, the work of the scientist is dominated by the fact of error. In presenting a general view of physics, Dr. Oppenheimer, wartime director of the famous Los Alamos laboratory, stressed, among other things, the physicist's preoccupation with error. In a sense the physicist's work is organized around the search for error and around the attempt "to see how error can give way to less error, confusion to less confusion, and bewilderment to insight." Note that Dr. Oppenheimer talks about error giving way to *less* error, and not to complete absence of error.

> In physics the worker learns the possibility of error very early. He learns that there are ways to correct his mistakes; he learns the futility of trying to conceal them. . . . The refinement of techniques for the prompt discovery of error serves as well as any other as a hallmark of what we mean by science.
>
> The work of science is disciplined, in that its essential inventiveness is most of all dedicated to means for promptly revealing error.

Dr. Oppenheimer regrets that some of the followers of Freud, and perhaps of Marx, have worked out techniques to protect those theories from the revelation of error. He states, "The whole point of science is to do just the opposite; to invite the detection of error and to welcome it."

SOURCE: J. R. Oppenheimer, Physics in the contemporary world, *Bulletin of the Atomic Scientists*, 1948, 4, 65–68; 85–86. Courtesy of the Educational Foundation for Nuclear Science, Inc.

Applying this idea to educational tests, suppose that you get a score of 50 on some standard test, and the reported standard error of estimate is 1.5. First of all, remembering the error that afflicts all tests, you will realize that 50 is not necessarily the *true* score that you really should get. The 50 should be regarded as one *estimate* of that ideal, true score. If a large number of such estimates were made, each would probably have some error. Two-thirds of those erroneous estimates would fall within 1.5 points of the true score, either way. Your score of 50 is one of the estimates. There are two chances out of three that the theoretical true score that you really want to know is within 1.5 points of this estimate of 50. There is only one "true" score, of course. But we can still say that this one score has two chances out of three of being between 48.5 and 51.5. In the same way, the card that you draw from the pack is only one card, but we can still say there is one chance out of four that this one card is a heart.

Deciding About the Needed Accuracy

In considering the standard error of estimate and its implications, we can see that error is inevitable, but that it can be managed. Even with imperfect scales we reach a conclusion with some degree of confidence. When necessary, moreover, the amount of error can often be reduced to some extent if we are prepared to take the trouble. In selecting tests, or in constructing our own tests, we should decide on just how much accuracy we really need and how much we can reasonably expect to get. The needed accuracy, of course, varies from task to task. In making crucial decisions about an individual (pass or fail, scholarship or no scholarship), we should go to some trouble to get the most accurate test we can. Such precision may not be necessary, however, in making tentative decisions (where to start on this project) about the class as a whole.

In the search for increased precision, we should be careful not to stress reliability at the expense of validity. For many purposes we can make do with tests having only moderate reliability. But validity is another matter. A test that fails to measure what we want to measure is useless, no matter how reliable it may be. In rating a teacher's effectiveness, for instance, we could get a very *reliable* measure (of something) merely by observing the number of times he used the chalkboard. But this may tell us very little about the kind of competence we have in mind.

Measuring Readiness for Instruction

Throughout educational history, tests or examinations have been used to find out if a student is ready for a given program or course of study. Especially for more advanced programs, *entrance* examinations, or matriculation examinations, have been used for this purpose. Such tests are also used to see whether or not younger children are ready to begin the study of reading at an early age, or to see whether or not they might profitably enroll in an accelerated program, or to determine whether they are now in a position to transfer from a special course of study to the regular school. It is also possible to work the other way around. In many programs of computer-assisted instruction (Chapter 6), for instance, the student is first given a test, and at that point a program is selected or developed to fit in with his current mastery and degree of readiness. Rather than directing the child to a suitable program, we could arrange a suitable program for the child. But in either case we would have to do some testing to decide what is suitable.

General Indicators of Readiness

There are a number of things to consider in deciding whether or not a child is ready for a given program. Some of these may be easy to observe, whereas others may call for elaborate testing. When physical development is important, for instance, we can often tell by simple inspection whether or not legs are long enough to reach the pedals, or fingers strong enough to press the keys. Age has long been used as a rough-and-ready—though far from precise—way of deciding if a child is ready for school in general, and this is simply a matter of birth record. The student's motivation or interest in the proposed task is sometimes fairly easy to determine and at other times may involve intricate tests. It is often most important to know if the student has mastered certain prerequisites demanded by the new task. At times this can be decided from the record of past attainment, but at other times more detailed tests must be given. General intellectual ability is frequently used as an aspect of readiness, and this means the use of highly technical tests. The following discussion provides more detail regarding tests of intellectual ability, and the problem of determining the mastery of prerequisites.

Intelligence Tests

There has been tremendous controversy about the use of intelligence tests as indicators of readiness (Goslin, 1967). In a later section of this chapter we discuss the objections to testing in general, and most of these general objections apply with special force to the question of intelligence tests.

Some Values and Limitations As pointed out in the discussion of child development, there is a great deal of controversy about the real nature of intelligence. Certainly we should avoid claiming any magic for intelligence tests. In considering them as indicators of readiness, we need not regard them as precise measures of some fixed and unalterable *ability*. For purposes of prediction it would be more cautious to regard them as tests of *achievement* in one area, which, as it happens, can be used to provide a very general prediction of achievement in the scholastic area. The typical intelligence test shows the child's present achievement in mastering the casual symbolic tasks that he has encountered in his ordinary experience. They reveal his mastery of the words he has come across. They show his ability to detect relationships (similarities, differences) between apples and stones, laziness and idleness. It is not surprising that the child who has done well in mastering these tasks may also do well in reading and arithmetic.

A student's performance on these out-of-school tasks often permits us to predict what he probably will do in the typical classroom situation. We may be more interested, however, in knowing what he really could accomplish if he fully exerted himself under favorable conditions. Here, of course, we would be probing for something like the *general ability* that some people have in mind when they think of intelligence tests. Obviously, these tests of performance would serve this purpose only if the student had fully exerted himself when he dealt with the out-of-school tasks.

However valid, or invalid, intelligence tests may be as measures of some fixed, intrinsic ability, they are useful to the placement counselor or administrators who must decide whether a given child is ready for some special program. They are also tremendously useful to the scientist who must secure comparable groups of students for his experiments. The classroom teacher, however, may use them less frequently. In deciding whether a student is ready for a particular lesson, or unit, he may rely less on the very general tests of intelligence, and more on highly specific tests of task prerequisites (see below), or on detailed tests of study skills, special aptitudes, or interests (see Mehrens and Lehman, 1969; Smith, 1969; Thorndike and Hagen, 1961).

Theoretically, of course, a teacher knowing a child's intellectual status could adapt the instructional processes to the child's intellectual level. In practice, however, this seldom happens, and perhaps it should not happen. All in all, many educators contend (Neisworth, 1969) that intelligence tests serve little day-in and day-out purpose in the classroom, and that they do lead teachers to form harmful prejudgments of certain children.

For all the very legitimate worries about intelligence tests, we suggest that they should not be regarded as complete evils, but rather as valuable devices which, like other valuable devices, can cause mischief if misunderstood or used improperly. You are almost bound to come across information based on these tests. A reasonable understanding of the tests should enable you to make prudent use of the information if you so wish. The same understanding should help you deal with any menace that such tests seem to pose.

Individual Tests of Intelligence For the most accurate measurement of intelligence, your testing office or school counselor will want to use one or more individual tests. These tests are given to one child at a time and permit the examiner to adapt his procedures to the child and to make sure that the general directions are understood. As a teacher you may never give one of these tests unless you also specialize in psychological testing. But you should know something of how they work.

For the younger child, the individual tests most likely to be used are the *Stanford Revision of the Binet Test* (Stanford-Binet) or the *Wechsler Intelligence Scale for Children* (WISC). In each test the pupil is asked to do many different things: answering questions of fact, giving the meaning of words, detecting similarities and differences in words and figures, working with simple designs and figures. In the WISC these are classified into verbal tasks and performance tasks, and the pupil can be given a separate score in each field. In the Stanford-Binet all tasks are combined to give a single score.

Group Tests of Intelligence Most teachers will probably have some experience in giving group tests of intelligence. At times you may be asked to administer

Some Intelligence Test Items

Look at the following words given below:
If the word contains A, E, and N, mark it with a 1.
If the word contains A and E, but not N, mark it 2.
If the word contains A and N, but not E, mark it 3.
If the word contains E and N, but not A, mark it 4.

Eaten
Elated

Nation
Plenty

In the lists given below, the numbers count up or down in some way, but in each list there is one and only one wrong number. Find the wrong number.

X 4 6 8 9 10
Y 9 8 7 6 4

From each of the lists given below, find the three words that are alike in some way:

walk, rest, hike, wart, tramp
sob, smile, laugh, frown, grin

In the examples below, fill in the missing signs (plus, minus, times, or division).

4 ____ 2 ____ 3 = 11
7 ____ 5 = 2 ____ 10

The words in the lists given below could be changed around to make a good sentence. Pick out the word that would be the first word in the sentence.

my not is book that
ran several boys the street down

SOURCE: *Kuhlmann-Anderson Test,* Seventh Edition, Booklet G, 1960. Reprinted by permission of Personnel Press, Inc., a subsidiary of Ginn and Company.

such tests as part of a larger testing program. At times you may give one of them on your own to get some supplementary information that you wish.

Unlike individual tests, the group tests can be given by any sagacious person who can read directions and follow them. There are many such tests available for almost all grades. Anyone reading this text must have taken a number of group tests during his student days. A few items from the *Kuhlmann-Anderson Test* appear in the box as reminders of the kinds of tasks used.

A group test may have anywhere from four to ten subtests. Each subtest presents a different type of task. As the accompanying illustrations suggest, the questions are typically in multiple choice form. Answers are usually placed on a separate answer sheet, and these can be scored either mechanically or by hand.

The Use of Age Scores After a child has taken a test we must find some way of giving meaning to his performance. It is not very helpful to know merely that Joe got a score of 18 or Susie a score of 22.

One of the major breakthroughs in the field of intelligence testing came early in the century when Alfred Binet suggested the use of age as an index of intelligence (see Chapter 3). Thinking now of the preteen years, we can see that age provides a valuable, if crude, indication of ability. Most of us have a general idea of some four-year-old powers that are beyond the two-year-old. Similarly, there are performances that might seem natural for a six-year-old but that would be surprising in a three-year-old.

The Stanford-Binet test relies heavily on this concept of age. Each of the tasks is assigned an age score. Some tasks, for instance, can be performed by most four-year-olds but by only a few three-year-olds. A child passing these tests, but going no further, would be considered to have a *mental age* of four years. A child's total mental age is a sort of composite based on the mental age level of all the tasks he has passed. If he gets a mental age score of 11 years 3 months, we know that, in general, he can do the tasks that the typical child of 11 years 3 months can do.

TABLE 10.1. Mental Age Equivalents for Raw Scores

Raw Score	*Mental Age* *Years*	 *Months*
33	7	1
34	7	2
35	7	2
36	7	3
37	7	4
38	7	6
39	7	6
40	7	7

Especially in the intermediate grades, the teacher may well pay quite a bit of attention to the mental age obtained from an intelligence test. Within limits, it should give a fair idea of the level of work of which the child is capable.

Mental Age Norms The Stanford-Binet test yields mental age scores automatically. The crude raw score we get from group tests, however, and from some individual tests, merely indicate the number of correct items, perhaps with some correction for guessing. At this point we have a *raw score* of (say) 36. To translate this into a mental age we consult a table of norms. A simple illustration appears in Table 10.1.

From Table 10.1 we see that 36 corresponds to a mental age (MA) of 7 years 3 months (7–3). This merely means that 36 is the score obtained by the *average* child seven years and three months of age. Some children of this age would get a higher score, others a lower score. This score is the *arithmetic mean* of children of this age. If you have any idea of the mental abilities of the *typical* child of 7 years 3 months, you now have a clearer notion of the mental ability of the child just tested.

Notice that in getting the pupil's mental age we did not need to pay attention to his actual chronological age. The pupil who got a mental age of 7 years 3 months in our example could have been 6 years old or 7 years old or 10 years old. Whatever his chronological age, his mental age is that of the average child of 7 years 3 months.

Suppose that tomorrow our pupil takes the same test over again and at this time gets a score of only 33. Looking at our table of norms, we see that this gives him a mental age of 7–1. *His mental age is now two months less than it was the first time he took the test.* This shows that we must not be misled by the word "age" in the term "mental age." True age, alas, can never be less tomorrow than it is today. But if the pupil's score fluctuates wildly from day to day, his mental age will fluctuate just as wildly. Mental age must not be considered as something as substantial and regular as chronological age but merely as a convenient device for giving meaning to a raw score. It has no more stability or dependability than the raw score from which it was derived.

Although age scales, when interpreted judiciously, can be useful in giving meaning to the scores of younger children, they become less useful as we approach adulthood. Most of us have no vivid picture of the differences in the intellectual powers of the 28-year-old as compared to the 26-year-old. Perhaps there is no difference whatever. To make intelligence-test scores meaningful for adults or older students we have to abandon the idea of age and make use of the notion of rarity or relative standing. Rather than asking, "What age group does our 18-year-old Arthur resemble?" we ask, "How does Arthur compare with other 18-year-olds? How far is he above or below the average for his age-group?" This notion of relative standing, by the way, can be used at any age level. We can ask, "How does this 5-year-old stand in relation to other 5-year-olds?" and we can ask, "How does this adult stand in relation to other adults?"

Intelligence Quotients As now used, the intelligence quotient, or familiar IQ, is a measure of relative standing. More precisely, it is a form of *standard score* (see the Appendix, pp. 646–647). It tells you where a child stands with respect to his age group.

This current use of the IQ is a departure from its original meaning. When first introduced, the IQ was a genuine quotient obtained by dividing the child's mental age by his chronological age. A 10-year-old child with a mental age of 12 would have an IQ of 120, showing him to be in advance of his years. A second 10-year-old child with a mental age of 7 would have an IQ of 70, indicating worrisome retardation.

The original form of the IQ was in use for half a century and during that time it acquired a number of definite meanings or connotations. To fit in with these connotations, the new IQ, commonly called a *deviation IQ*, has been calibrated so that the numbers mean about the same thing as the older form of the IQ. As presently calculated, an IQ of 115 or 116 means that the pupil is one *standard deviation* above the average for his age group. A score of 68 or 70 would mean that he is two standard deviations below the average for his age.

To determine the deviation IQ you consult a table of norms. To use this table you will need to know the pupil's score on a test and his age (see Table 10.2).

TABLE 10.2. Deviation IQs

Total Score	*Chronological Age*										*Total Score*
	5–9	*6–0*	*6–3*	*6–6*	*6–9*	*7–0*	*7–3*	*7–6*	*7–9*	*8–0*	
41	112	104	97	92	88	85	82	79	77	76	41
42	114	105	98	93	89	86	83	80	78	77	42
43	115	106	99	94	90	87	84	81	79	78	43
44	116	107	100	95	91	88	85	82	80	79	44
45	117	108	101	96	92	89	86	83	81	80	45
46	118	109	102	97	93	90	87	84	82	81	46
47	119	110	103	98	94	91	88	85	83	82	47
48	121	112	105	100	96	93	90	87	85	84	48
49	122	113	106	101	97	94	91	88	86	85	49
50	123	115	108	103	99	96	93	90	87	86	50

SOURCE: Modified from Manual, *Kuhlmann-Anderson Test*, Seventh Edition, Booklet A. Reprinted by permission of the Personnel Press, a subsidiary of Ginn and Company.

Suppose that a pupil of 5 years 9 months gets a total of 48 items right. Going down the column for 5–9 until we come to 48, we find that this would give him a deviation IQ of 121. If an 8-year-old had obtained this same score of 48, his IQ would be 84.

TABLE 10.3. Some Representative Intelligence Quotients

IQ	SD's *from the Mean*	*General Description*
180	5	Perhaps reached by 50 people in a million.[a] May be typical of outstanding geniuses of the past.
150	3	Mean of honor graduates of topnotch graduate professional school. Perhaps reached or exceeded by one person in a thousand.[a]
140	2½	Mean of men listed in *American Men of Science*. Attained by 5 people in 1000.
130	2	Mean of Ph.D.'s.
120	1¼	Mean of college graduates.
115	1	Mean of freshmen in typical four-year college.
110		Mean of high school graduates. 50–50 chance of graduating from college.
105		Has 50–50 chance of passing academic course in high school.
90		Adult can learn moderately complex machine.
75	−1½	50–50 chance of reaching high school. Adult can run small store.
50	−3	Adult can do simple carpentry, domestic work. Great difficulty in learning to read. About 5 people in 1000 fall below this IQ.

[a] These proportions are taken from Sir Cyril Burt, Is intelligence distributed normally? *British Journal of Statistical Psychology*, 1963, 16, 175–190.

Representative IQs In Table 10.3 we see a list of certain IQs together with the *general* level of achievement they represent. Remember that these are based on very general averages. They must not be regarded as hard-and-fast cutoff points.

The IQ, or some approach to it, is still the most popular standard score for indicating relative standing on an intelligence test. Some tests, however, such as those administered by the College Entrance Examination Board, use a standard score with a mean of 500 and a standard deviation of 100. A student with a score of 400 would be one standard deviation below the mean. For an intelligence test this would correspond to an IQ of 84. (For a more detailed comparison see the Appendix, pp. 646–647.)

Percentile Ranks The standard score is intended to be a measure of distance. By using it you say, in effect, "I live a mile and a half from the center of the village." In using the *percentile rank* (see the Appendix, pp. 642–644) you say instead, "My house is farther out of town than 80 percent of the houses. Only 20 percent of houses are farther away." Each of these approaches gives some idea of distance from the average, but gives it in slightly different ways.

In Table 10.4 we see a typical means of providing percentile ranks. A student with a raw score of 110 on the *Concept Mastery Test*, for instance, would exceed 79 percent of the education majors at X University. A student with a score of 115 would exceed 85 percent. Percentiles for intermediate scores are usually given. In using this brief table, however, they would have to be estimated.

TABLE 10.4. Percentile Ranks (Approximate) for Concept Mastery Test

	Reference Groups		
Raw Score	*450 Education Majors in X University*	*98 Engineers and Scientists Applying for Special Grants*	*1500 Adults from Terman's Study of the Gifted*
130	92	74	35
120	88	68	25
115	85	63	20
110	79	60	17
105	77	57	14

Notice how the percentile rank of a score differs from group to group. A student with a raw score of 110 would exceed 79 percent of the education majors but only 60 percent of a particular group of practicing engineers and scientists, and only 17 percent of a special group of gifted students selected for an elaborate follow-up study. When you set out to use percentile ranks to give meaning to raw scores, be sure to use a reference group that makes sense for your purposes.

Not all tables of percentile norms follow this form precisely. In Table 10.5, for instance, things are turned around, but the same information is presented. Here you would locate a student's raw score in the appropriate column and then read across to the left to get his approximate percentile rank.

Mastery of Prerequisite Skills

Readiness for a task calls for more than general ability. In approaching any new task there are certain prerequisite skills necessary for any success. Before he can hope to succeed in a new unit on the addition of fractions, for example, the student should have some elementary computational skill at his command. He should be able to add and subtract simple numbers and to do elementary multiplication. To be able to perform these elementary operations, in turn, he must have been able to count, and must have had some general concept of

TABLE 10.5. Percentile Ranks for Scores in Specified Subtests

Percentile Rank	*History*	*Arithmetic Computation*	*Speed of Reading*
75	48	62	28
70	45	58	25
65	43	55	23
60	41	53	22

numbers. For most tasks we can visualize such a hierarchy of prerequisite abilities in which the skill at each level serves as the basis for the more advanced step.

Recently a great deal of attention has been given to the process of analyzing a new task into a hierarchy of compound skills (Brandt, 1970; Gagné, 1970; Tyler, F. T., 1964; Ausubel, 1959). Clearly this process calls for a great deal of effort. The task must be analyzed to determine just which prerequisites must be mastered before the new task can be undertaken. It must also be decided just how much competence is necessary in each of these. Each child is then tested to determine if he has the required competence in this hierarchy of prerequisites. Remedial work, if needed, is then arranged. This emphasis on meticulous task analysis has played a part in the development of psychological theory (Chapter 4), and is considered later in this chapter in connection with the careful description of objectives. It is also linked with the principles of programmed instruction discussed in Chapter 6.

Measuring Achievement: Some General Problems

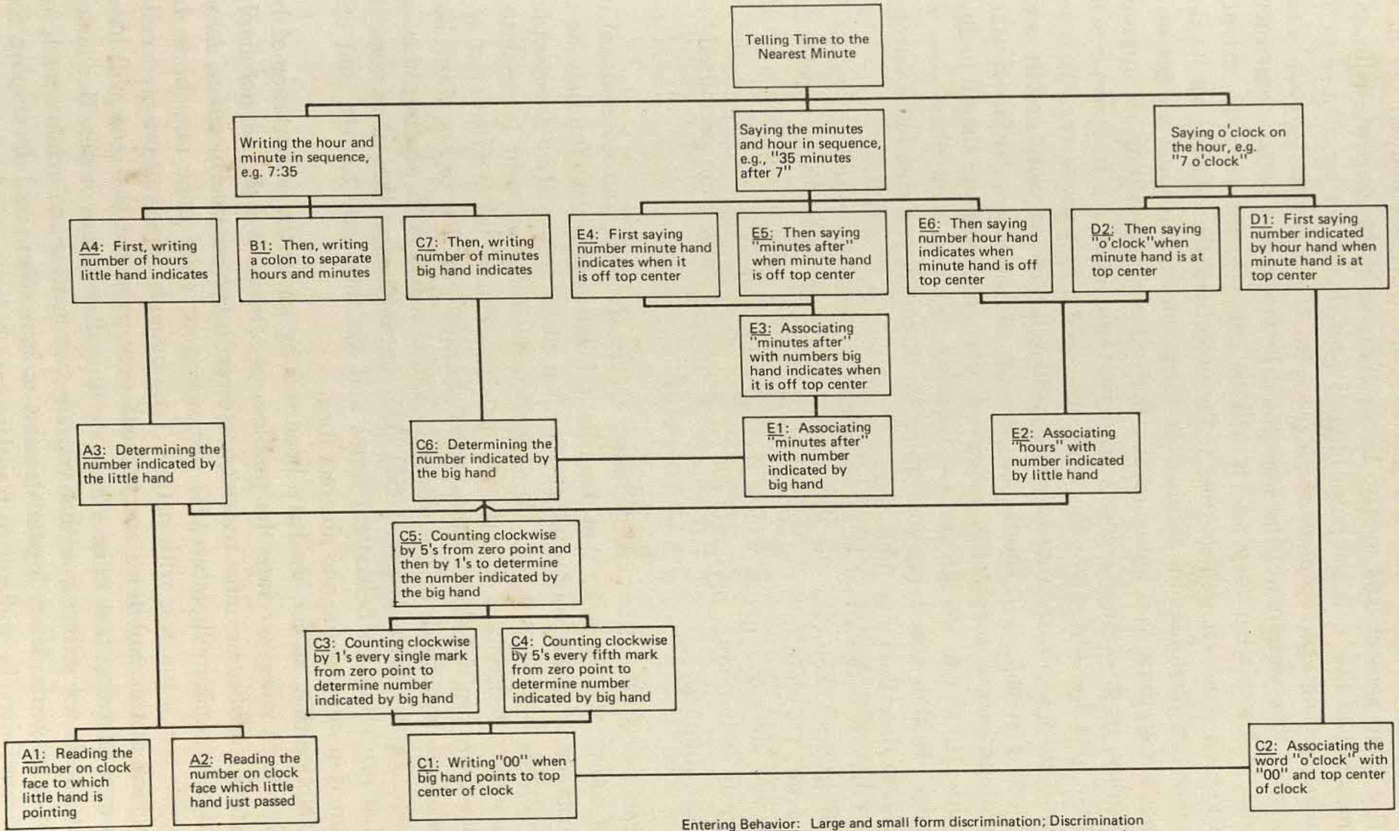
In measuring readiness, the teacher asks if it is wise to have the student begin this project. In measuring achievement, he asks if the student has completed the project, or how close to completion has he come. The two processes, however, are not completely different. Tests of past achievement are useful in estimating promise for the future. And many tests professing to measure readiness are, in effect, measures of the child's achievement in mastering the casual tasks encountered outside the school.

The Matter of Objectives

Typically, the achievement test is intended to find out how well the students are accomplishing what they are supposed to accomplish, or the *objectives* that have been set by someone. In all this, by the way, the psychologist is not the one to

An Hierarchical Arrangement of Tasks

The lower-level accomplishments are needed to perform the tasks immediately above. The upper-level skills are channeled into the main task—telling time from the clock.


Telling Time to the Nearest Minute
Writing the hour and minute in sequence, e.g. 7:35
Saying the minutes and hour in sequence, e.g., "35 minutes after 7"
Saying o'clock on the hour, e.g. "7 o'clock"
A4: First, writing number of hours little hand indicates
B1: Then, writing a colon to separate hours and minutes
C7: Then, writing number of minutes big hand indicates
E4: First saying number minute hand indicates when it is off top center
E5: Then saying "minutes after" when minute hand is off top center
E6: Then saying number hour hand indicates when minute hand is off top center
D2: Then saying "o'clock" when minute hand is at top center
D1: First saying number indicated by hour hand when minute hand is at top center
E3: Associating "minutes after" with numbers big hand indicates when it is off top center
A3: Determining the number indicated by the little hand
C6: Determining the number indicated by the big hand
E1: Associating "minutes after" with number indicated by big hand
E2: Associating "hours" with number indicated by little hand
C5: Counting clockwise by 5's from zero point and then by 1's to determine the number indicated by the big hand
C3: Counting clockwise by 1's every single mark from zero point to determine number indicated by big hand
C4: Counting clockwise by 5's every fifth mark from zero point to determine number indicated by big hand
A1: Reading the number on clock face to which little hand is pointing
A2: Reading the number on clock face which little hand just passed
C1: Writing "00" when big hand points to top center of clock
C2: Associating the word "o'clock" with "00" and top center of clock

Entering Behavior: Large and small form discrimination; Discrimination of pointer directions; Following simple verbal directions; Discriminating and writing numbers; Counting to 60 by 1's and by 5's.

SOURCE: Robert Glaser and James Reynolds, "Instructional Objectives and Programmed Instruction: A Case Study," in C. M. Lindvall, ed., *Defining Educational Objectives*. By permission of the University of Pittsburgh Press. © 1964 by the University of Pittsburgh Press.

decide who should determine the objectives. As we pointed out in Chapter 5, this is an ancient controversy. In the past, as in the present, many people have maintained that it is the pupil himself who should set his own objectives. Other educators and philosophers see a place for objectives set by social demands. No matter who determines the objectives, however, the person constructing a test should know what they are. It will be easier to measure the extent to which these objectives have been met if the objectives themselves can be described in clear-cut, unambiguous fashion. At times, indeed, in the very act of specifying your objectives, you automatically find yourself describing an appropriate test. Earlier, in discussing a course in driver education, for instance, we mentioned, as a possible objective, the student's ability to park a car. To avoid undue ambiguity you may want to specify this objective in more precise and concrete form. You say, "He should be able to park a car (size specified) (with or without power steering) in a space of —— feet, no more than 6 inches from the curb. He should do this in —— seconds, using no more than —— changes of gear." In thus specifying your objective in concrete and definite terms, you have almost described a suitable test.

Objectives described in terms similar to those just used are called *behavioral objectives*. They describe the desired outcomes in terms of specific acts or behavior. They indicate the *conditions* or *context* (size of car, power steering or no power steering) under which the behavior should occur. They also give standards of *minimum performance* (closeness to curb; time permitted; number of gear changes).

Behavioral Objectives and Ultimate Goals Not all your educational objectives, of course, will be so easy to describe in behavioral terms. You may be trying, for instance, to have your students develop more appreciation for people in other cultures. And here it may be difficult to translate all your hopes into precisely described behavioral objectives. Unless you can visualize *some kind of behavior*, however, you will find it difficult to determine whether or not your objective has been accomplished, or the extent to which it has been accomplished (Popham, 1969; Payne, 1968; Mager, 1962). The accompanying box gives some objectives that are stated in behavioral terms and are thus easy to test, and other items stated in more vague and abstract form.

Notice that, so far, we have been talking about the importance of behavioral objectives when we face the problem of *testing*. We should not imply that in actual *teaching* we must restrict ourselves to behavioral objectives. As you begin this new unit in literature, for instance, your chief hope may be to have your pupils feel a oneness with nature. True enough, your test-oriented colleague, in looking at this ambitious aim or goal, may point out that you will have trouble in ever knowing how close you come to realizing your hopes. But in telling you this, he is not telling you that you are wrong to try to achieve such long-range hopes or goals. Many legitimate aims of education (e.g., developing responsible citizens) may be difficult to translate into behavior that might occur while the

General Goals and Behavioral Objectives

1. Teacher's general description of objective.
   "Ability to relate knowledge of historical events to current social issues." (Note: Such a general "objective" might better be labeled "goal," or "aim.")
2. Goal illustrated by use of behavioral descriptions.
   Given an event such as the war with Mexico, the student should be able to mention current problems or activities which are linked to that event, or which resemble it in some way. Conversely, given some current event, the student should be able to mention historical parallels and to show how the parallel resembles the current event and how it differs.
3. Sample question derived from behavioral illustration.
   A. Look over items 1–6 given below and select any *three* items for treatment.
   B. For each item that you select, *mention* (do not elaborate) at least three other historical events (prior to 1950) which had some resemblance to this item, or which had some bearing on it.
   C. You should now have listed a total of at least nine historical events. Select any *three* of these events for discussion. Show how each of these events bears on the item for which it was selected. Point out any cautions that should be kept in mind in considering this bearing.

Items: (Select ANY three.)
1. The Watts riots
2. International conversations on fishing in coastal waters
3. The Tonkin Gulf resolution
4. Women's Liberation League
5. Legal controls of marijuana
6. Increased freedom of sexual expression

student is still enrolled in your course (Broudy, 1970; Eisner, 1967). Some psychologists (Payne, 1968) suggest that we use terms like *aims*, or *goals*, to describe these long-range, ultimate outcomes, and reserve the term *objectives* for the more immediate, proximate outcomes which might develop during a course, or similar school experience.

In the process of testing we are likely to concentrate on immediate, proximate behavioral objectives, even though our real interest is in something more remote and more difficult to reduce to behavioral terms. Indeed, we are usually forced to use tests that emphasize rather specific behavioral objectives, no matter how much our real interest lies in something more general. In teaching citizenship, for instance, we may really hope that our students will come to take an active interest in community affairs. As one specific sample or index of such a general interest, we may check to see whether or not they volunteer to help with the community fund. The thing we have in mind is much more general than this specific act, but the act can be stated in behavioral terms, and thus becomes more susceptible to measurement.

This use of immediate, specific behavioral objectives to measure more general long-range goals (as in citizenship education) stands in marked contrast to the situation in driver education. Ability to park the car in specified fashion is one of the long-range goals that we really have in mind, and it is also an immediate, specific, behavioral objective that could be used as one test item. In this course, as a matter of fact, it would be quite permissible to "teach to the test" and to drill the student on this parking test. When he has passed this item, he has also met one of our intrinsic aims. In teaching citizenship, on the other hand, this "teaching to the test" would be ridiculous and wrong. By drawing attention to the immediate specific act of "volunteering to help in the community fund," you would render this behavior useless as an index of progress toward your more general ultimate goal.

Although ultimate goals may well exceed immediate objectives, psychologists (Sullivan, 1969; Bloom, 1969; Payne, 1968) have pointed out that in teaching as well as in testing, there is much to be gained from going as far as you legitimately can in translating your long-range intrinsic goals into behavioral objectives. In trying to translate your goals into clear-cut ways of behaving, you often get a more definite idea of the goal itself, and from this effort you may find yourself discarding a lot of high-sounding verbiage that has little meaning. Like the novelist or dramatist, moreover, you may find that concrete behavioral illustrations help you in describing your goals to others. And if you are to resort to any form of programmed instruction (see Chapter 6) you will find it almost imperative to translate your goals into terminal behavior or behavioral objectives.

In one recent controversial proposal there would be a tremendous need to state all objectives in precise and testable form. This is the proposal for *performance contracting*. Under such radical arrangements, the school district would contract with some commercial organization to teach specified objectives, the fees to be paid when the objectives are accomplished. This is not the place, of course, to discuss the possible effectiveness or the educational merits of such a proposal. We can see, however, that it calls for a precise statement of objectives. We can also see that in this arrangement the problem of teaching to the tests might become a worrisome issue.

To facilitate the process of translating general goals into precise objectives—for whatever purpose—Bloom and his associates (Krathwol, Bloom, and Masia, 1964; Bloom and others, 1956) have worked out elaborate structures or *taxonomies*. In such a taxonomy, objectives are presented in the form of a hierarchy. Thus for any subject mere recall of information might be a lower-level objective. Beyond such recall, but relying on it, we might suggest comprehension or understanding as an objective. Building upon these accomplishments, in turn, a higher objective might call for evaluation, or a synthesis of different kinds of information, or for creative productions that utilize the simpler objectives (Smith, 1969). A brief outline of one of the taxonomies—that dealing with the cognitive domain—appears in the accompanying box. These are only some samples. Other ways of specifying and organizing objectives are also available (Gerlach and Sullivan, 1967; Scriven, 1967).

Essay Examinations

To bring up the topic of testing is to let loose a great deal of argument about the merits of essay tests as opposed to the objective variety. Teachers hold strong views on the subject (Torbet, 1957). These arguments, it is true, may enliven a dull session in the teachers' lounge, but on the whole they tend to be a bit unfortunate. As we shall see, each of the testing devices is well adapted for some things, but clumsy and awkward when used for other purposes. To ask which is better *in general* is like asking a plumber to decide whether he prefers a wrench or a hammer. Surely he would ask what the tool is to be used for.

Advantages and Disadvantages The familiar essay examination has many advantages. It is relatively easy to construct. True, it takes time to phrase a really good question, but the teacher who knows his subject can turn out some kind of essay examination in a short space of time. Some instructors, indeed, have been suspected of making out their questions on the way from the parking lot to the examination room. With the essay examination, moreover, elaborate mimeographing or printing, although to be recommended, is not an absolute must. Our casual instructor could, if nothing better offered, merely write his questions on the chalkboard.

Going beyond mere convenience, we find that for some purposes the essay test has a high degree of validity. There is no other way, for instance, to find out how well a student can express himself in writing. It also serves as a more natural test of the student's ability to structure and organize his ideas, and to produce something on his own. It may permit or require him to make subtle distinctions. There is no need to be satisfied with a flat-footed "Yes" or "No." The essay test, moreover, offers less temptation to guess. The different possibilities are not neatly lined up, asking for an eeny-meeny-miney-moh approach. Many students report that they study for essay examinations in a way that stresses organization. They look for broad, general concepts and for relations between concepts. They are less tempted to memorize isolated elements.

But the essay test also has disadvantages. On the practical side, it is exceedingly laborious to grade or score. The grades, once attained, tend to be very subjective. For years the educational literature has reported instances of tremendous disagreement when several qualified examiners all mark the same

An Organized Taxonomy of Educational Objectives: Illustrations from the Cognitive Domain

The Cognitive Domain is broken down into a number of aspects. The mastery of any field—biology or history, for instance—calls for the following cognitive aspects:

1.00 *Knowledge* of many things, small and large
2.00 *Comprehension* or understanding of those things
3.00 *Application:* Ability to apply the items known and understood to a particular problem or situation
4.00 *Analysis*, or seeing the essential parts of the thing being considered
5.00 *Synthesis*, or putting the parts together to create something new
6.00 *Evaluation*, or judging the worth of a thing or the extent to which it meets certain criteria

Each of these six aspects, in turn, is broken down into subaspects. This more detailed breakdown is given for the component of 1.00 *Knowledge*.

1.10 Knowledge of specifics
  1.11 Knowledge of terminology. (Meaning of terms like "cat," "legs," "four," or "4.")
  1.12 Knowledge of specific facts. ("Cat has four legs.") ("London capital of England.")
1.20 Knowing ways and means of dealing with specifics
  1.21 Knowledge of conventions ("agreed-upon ways of spelling, grammatical rules, numerical notations, etc.")
  1.22 Knowledge of trends and sequences ("Kitten grows into cat.") ("Extension of franchise in USA.")
  1.23 Knowledge of classifications and categories ("Animal versus plant"; "Executive versus judicial.")
  1.24 Knowledge of criteria ("Basis for deciding on truth or falsity"; "for judging adequacy.")
1.30 Knowledge of Universals and Abstractions
  1.31 Knowledge of Principles and Generalizations ("Gas expands when heated"; "gene structure and interbreeding.")
  1.32 Knowledge of Theories and Structures ("Evolution-Biology"; "Challenge and response—History.")

SOURCE: B. S. Bloom, ed., *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain*. New York: David McKay, 1956.

papers. Such disagreement, although frequent, is by no means universal. On short essays, dealing with factual material, there can be marked agreement, reaching coefficients of 0.98 between raters (Grant and Caplan, 1957; Pidgeon and Yates, 1957). When the essays are longer and are scored for comprehension and general mastery, the agreement drops sharply to a correlation of .80. Ironically, it appears that the essay test may be least dependable when doing the very thing for which it is chiefly valued.

Judging the Quality of Essays

At three eastern colleges 150 freshmen wrote essays on "Who Should Go to College?" and another 150 wrote on "When Should Teen-Agers Be Treated Like Adults?"

The 300 essays were submitted to 53 judges selected as being outstanding representatives of the following fields: college English teachers, social and natural scientists, writers and editors, lawyers and law professors, and business executives. Each of the 53 judges read all 300 papers, assigning each a grade, and commenting on what he liked or disliked about each paper. None of the judges saw the comments or grades of the others. The judges were not given a key or a set of objectives to go by. The grades assigned could range from 1 through 9.

Maximum disagreement would be shown if the 53 grades for an individual paper ranged all the way from the very lowest to the very highest. This actually happened for 100 papers or one third of the total. For another 100 papers the marks assigned by the 53 judges ranged over 8 of the 9 grades. For the single paper showing the *greatest* agreement, the marks ranged over 5 grades.

The ratings given by college teachers showed no more agreement among themselves than those given by people in the other professions. Among the judges, editors and writers showed somewhat more agreement than did other groups.

SOURCE: Judges disagree on qualities that characterize good writing, *Educational Testing Service Developments*, 1961, 9, 2.

Ordinarily the essay examination permits only a very limited sampling. Of all the topics covered in the course, we can ask questions about only a few. In discussing those questions, moreover, the student, although discouraged from guessing, may be tempted to bluff. For some people it is easy to write persuasive nonsense about almost any subject. Even when no deliberate bluffing is intended, the general style and expression, including neatness and punctuation, may have an undue effect on the grade.

Setting the Examination Some of the worrisome undependability of the essay examination may come not from weakness in the scoring as such but from the students' uncertainty about what is required. If you wish the student to deal with a fairly specific task, spell it out in some detail. "Discuss the use of rating scales in the classroom," for instance, is rather general. To be more specific one might say, "Point out several (at least two) classroom situations in which rating scales might be especially useful. Mention two difficulties in the teacher's use of rating scales and show in each case how one might deal with these difficulties."

As far as sheer reliability is concerned, it would be better to have quite a few questions, using a variety of forms. By chopping the examination up into too many questions, however, you may give up some of the advantages to be expected of the essay test.

From the point of view of dependability or reliability, there is little to be gained by the use of optional questions or by the use of open-book examinations. Such things, it is true, may make for better morale or a better feeling between teacher and student. They do little to reduce inequities, however. For one thing, the better student has more ability to find his way around in the text. Often, therefore, the open-book procedure merely permits the better student to increase his lead (Green, 1963).

For ambitious essays, especially where the quality of writing is a crucial issue, some writers (Diederich, 1960) would recommend distributing the assignment over two days. On the first day the pupil chooses a topic, prepares an outline, and writes a rough draft. To reduce the temptation to get unauthorized help, the teacher keeps these outlines and drafts and returns them the following day. The pupil then completes a finished paper during the school period. This provides an opportunity for moderate reflection without which it would be unreasonable to expect anything in the way of acceptable writing (Cousins, 1963).

Scoring the Papers Several procedures have been developed for increasing the consistency of scoring essay tests. Almost all of these are time consuming and somewhat complex. In actual practice you will have to decide, on a realistic basis, whether the greater reliability is worth the considerable trouble involved.

Reliability will be increased if two people read each paper. Three people will be slightly better but not a great deal better than two. If the stakes are such as to justify two or more graders, there is something to be gained from a preliminary analysis of the points to be looked for and the weight to be given each. The examiners should be sure they agree on these weightings, and there should be a few trial scorings followed by discussion. This procedure of clear-cut weightings is more appropriate for some essay questions than for others.

A second procedure emphasizes a more global approach and urges you, in effect, not to strive for undue precision. Under this procedure the examiner, working with one question at a time, makes a very rough preliminary sort for that question. In one variation (Diederich, 1960), you first sort the papers into three rough piles—those that attract favorable attention, those that are not distinctively bad or good, and those that strike you as poor. You may gain some precision if you go over the piles and reshuffle them so as to get half of the papers in the middle pile, one-quarter in each of the other two piles.

When this is done each of the three piles is again sorted into three more groups, making for nine groups in all. Since this grouping fits the stanine values (see the Appendix, pp. 647–648) you may gain further precision by again shuffling papers until they approach the proportions in each of the regular stanines, namely:

Stanine	1	2	3	4	5	6	7	8	9
Proportion	1	2	3	4	5	4	3	2	1

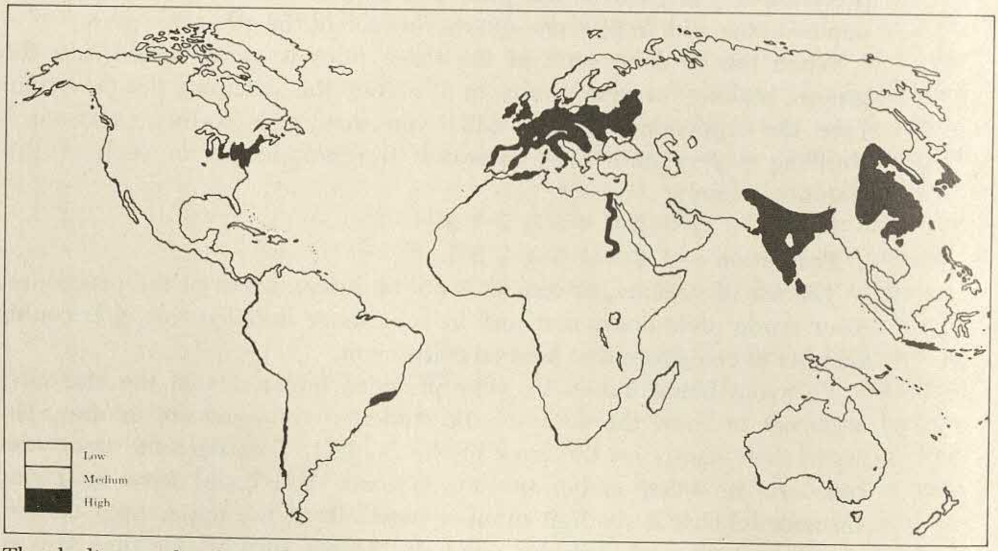
The use of stanines, of course, is not an integral part of the procedure. Both in your crude preliminary sort and in your more detailed sort, you could use any number of categories that seemed convenient.

To avoid being biased by your previous impression of the student you may wish not to know the name of the students while you are grading. Have them write their names on the back of the booklet. To secure the same result, some teachers use fairly elaborate code systems. You could have each student, for instance, choose a six-digit number, write it on the upper right corner of page one, tear it off, and write his name on the slip torn off. He then also writes the number on the left side of page one, leaving this number on the paper. After marking you can match numbers to get the names. If two numbers should be the same, the fit of the slip should settle the matter.

Objective Examinations

To a great extent the objective tests are strong where the essay examination is weak, and weak where it is strong. Unlike the essay examination, the objective test is difficult to construct. This problem is treated in detail later on. We have to go to a great deal of trouble to construct even an ordinary objective examination. A good one is a real undertaking. For objective tests some form of reproduction is almost essential. Even with liberal office facilities, this often means preparation well in advance. Without such facilities the preparation means great trouble or expense. The scoring of most objective tests, on the other hand, is beautifully simple. At times it can be done by machine. With reasonable supervision it can be done by an assistant or by any adult relatives who may be coaxed or coerced into assisting. Many teachers find it feasible and profitable to have the students themselves do the correction, using the time-honored procedure of exchanging papers.

It was the issue of dependability or reliability that first led to the development of objective tests, and it is not surprising to learn that they are excellent in this respect. With few exceptions, there is little likelihood of disagreement when several scorers mark the same paper. Although reliability is not automatically guaranteed, by taking a little trouble we can usually come out with objective tests that are fairly reliable. Objective tests permit wide sampling. They discourage the bluffer. But they do encourage guessing.

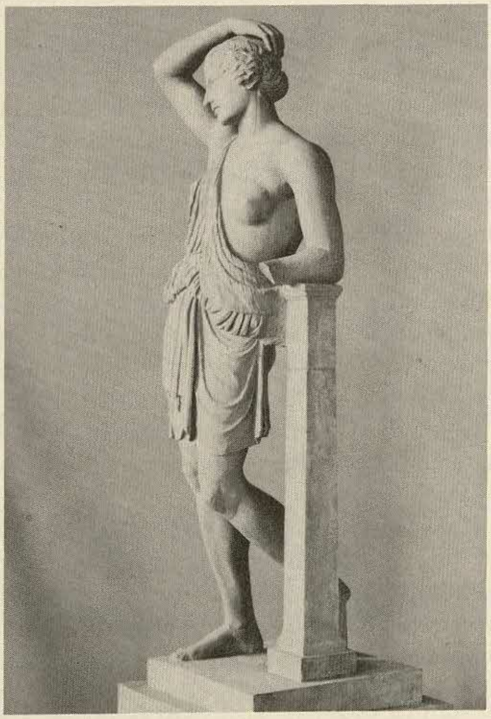


The shading on the above map is used to indicate

(A) population density
(B) percentage of total labor force in agriculture
(C) per capita income
(D) death rate per thousand of population

Figure 10.1. An illustration of a multiple-choice question calling for interpretation. Reprinted with permission from "Multiple Choice Questions: A Close Look," copyright 1963, Educational Testing Service, Princeton, N.J. (A is the correct answer.)

There is one argument frequently leveled against objective tests that we must take seriously. Many critics hold that such tests can reveal only the mechanical recollection of isolated facts. Clearly there is an element of truth in this accusation. It is easier to frame objective questions that deal with isolated facts. And it is true that many students in preparing for such tests do look for isolated factual nuggets and ignore broad, general principles. The proponents of objective tests, on the other hand, insist that the tests are not limited to this mechanical procedure. They hold that by using your ingenuity, or by taking advantage of the ingenuity and efforts of other people, you can get objective test items that are thought provoking to a high degree. Notice the questions in Figures 10.1 and 10.2, for instance. Neither of these merely asks the student to repeat something that he has studied. Each, on the contrary, demands that he should make use of his information by applying it in logical fashion to some new problem.



The Metropolitan Museum of Art, gift of John D. Rockefeller, Jr., 1932

In which of the following centuries was the piece of sculpture shown above most probably produced?

(A) The fifth century B.C.
(B) The fourteenth century A.D.
(C) The sixteenth century A.D.
(D) The eighteenth century A.D.
(E) The twentieth century A.D.

Figure 10.2. An illustration of a multiple-choice question calling for interpretation. Reprinted with permission from "Multiple Choice Questions: A Close Look," copyright 1963, Educational Testing Service, Princeton, N.J. (A is the correct answer.)

Preparing True-False Questions To obtain the potential benefits of the objective test and to counteract some of its defects, we must give considerable thought to the selection of the topics and the preparation of the items (Green, 1963). To take advantage of the opportunities provided for good sampling, for instance, we must be sure that the bulk of the items are not drawn from one or two units of the course.

Avoid the tendency to lift individual sentences directly from the text. This favors the student who has slavishly memorized the actual words of the assignment. It is better to construct an item that calls for the sense of a paragraph or larger unit. Even if one sentence in the text does summarize this general meaning in neat fashion, the actual wording should be changed.

Be sure that the truth or falsity of the item hinges on an important idea, not on some incidental or parenthetical phrase. Be careful about "giveaways" or specific determiners. Even a fairly naive pupil can sense that, on the average, it takes more words to phrase a true statement. He is also alert to the fact that such terms as *all, always, never, none, no, only, alone* are typical of false statements. As in all testing, go over the items to eliminate ambiguity. If the answer hinges on the meaning of such a word as *large* or *many*, see if you can change it to something more definite (*over .80; at least 75 percent*). Try to avoid negative statements. Suppose, for instance, we say, "Objective tests are not limited to the testing of factual material." Since objective tests do not have this limitation, the general idea is false. The precise wording, however, makes the statement true. Unless you want to test the student's ability to deal with such technical niceties, it would be better to say, "Objective items are limited to the testing of factual material." Here the statement is false both generally and in its technical phrasing.

If a statement is open to dispute, include some authority or reference. "Writers on test construction (Chauncey, for instance) hold that multiple-choice questions can be used effectively to test ability to interpret and to apply general principles." Try to use a general authority, such as the author of the textbook. Otherwise a student may know that the statement was made but may not be sure that it was made by this particular man.

Preparing Multiple-Choice Questions As compared to true-false items, the multiple-choice questions take longer to prepare and take up more room. They also take slightly longer to answer. Typically this will mean fewer items and consequently less adequate sampling. With multiple-choice questions, however, the temptation to guess, although still present, may be less pronounced. Having more alternatives, the multiple-choice question can also call for finer shades of discrimination. From the point of view of scoring, there is nothing to choose between the true-false and multiple-choice test. Both are completely objective.

The problems of constructing true-false items also apply to multiple-choice items. Here, as with true-false items, we have to worry about "giveaways" or specific indicators. Here again, such flat-footed terms as *never*, *always*, and so forth, betoken the false answer. The correct choice is often stated more cautiously and at greater length.

In constructing multiple-choice items, we typically work out a correct choice and then arrange for a number of plausible alternatives or decoys. Be careful not to give things away by sheer grammar as in the following example: "The word *readily* is most frequently used as an (1) adverb; (2) participle; (3) verb; (4) pronoun." Here "adverb" is the only word that would follow "an." Obviously the decoys must be plausible. A response that no one would ever accept is completely useless. In constructing the test we should try to avoid this possibility. In revising a test that has already been taken, we should find a substitute for alternatives never chosen.

Try to make sure that the plausibility does not hinge on a general familiarity with the course. Suppose, for instance, that an item would appear plausible only to someone generally familiar with the course. In that situation, the poor student would never see it as plausible and would never be tempted. A somewhat better student, however, may know enough to see its plausibility, and will thus run the risk of entrapment. We should avoid decoys that will attract only the better students.

All the alternatives should be mutually exclusive. Otherwise more than one answer could be correct. Avoid items like the following: "Group tests (1) are almost always objective; (2) can be given by the typical teacher; (3) are more reliable than individual tests." In any one question, moreover, it is better to use a homogeneous group of alternatives. In the example just given, for instance, all choices should deal with reliability, or with ease of administration, or with some other single feature.

Arranging Items in Order Most students get along more easily if all the true-false questions are in one section, all the multiple-choice in another section, and so forth. Under such arrangements there is no need for a frequent change of set or general attitude. This is by no means an inviolable rule, however, and if you have some reasons for placing two or three kinds of items close together, do not hesitate to do so.

The ordering of items within a section is of some importance. In arranging the true-false items, avoid any clear-cut or detectable alternation between the true and the false. Ideally it would be best to follow the toss of a coin. But in any case, try to arrange for a random or unpredictable pattern. In your general sequence of testing, try to avoid any marked preponderance of either true or false. In any one test, however, it is not necessary, or even wise, to arrange for precisely equal numbers of true or false items.

In arranging multiple-choice questions, you also want to avoid any clearly detectable pattern for the correct choice. With these questions, moreover, it is also important to make sure that one position is not unduly favored for the true answer. Go to some trouble to make sure that the correct choice is not usually item "b" or item "c." In some questions there will be a natural progression of alternatives. For instance: "A good intelligence test might attain a reliability of .45; .60; .75; .90." Start with questions that have a natural order such as this. Then juggle the order of the remaining items so that, on the average, the correct choice occurs just as frequently in one position as another.

Standard Tests

There is much to recommend the standard, ready-made tests whenever they apply to our course material and whenever the occasion justifies the expense. The makers of standard tests are very conscious of the matter of accuracy or reliability. Examinations are pretested and then improved until they attain a high degree of reliability. And in this age of gimmicks, the standard tests are often the last word in general convenience and in ease of scoring. In getting an adequate sample of the content to be tested, moreover, and in the careful phrasing of the actual items, the expert will do a better job than anything the typical teacher can hope to accomplish.

The problem of objectives becomes crucial in deciding about standard tests. There is always the possibility that the things stressed in the standard test do not fit the objectives of your school. Sometimes, and especially in some subjects, there may be an admirable match. Sometimes the two sets of objectives may have little in common.

There can be several undesirable results from the use of a standard test that does not fit the local objective. Results may be misleading. Both teacher and pupils may become resentful. Finally, if such tests are used over a period of years, teachers may gradually abandon the stated local objectives and direct their teaching to the things actually stressed in the tests (Mahler and Smallenburg, 1963; Tyler, 1963). If the tests are not made to follow the stated objectives, the *actual* objectives may come to follow the tests.

Making Use of Norms Like the tests of intelligence, the standard achievement tests provide norms of attainment. By the use of these norms you can compare your class with some specified group. You can find out, for instance, how your grade six class compares with the average for grade six pupils throughout the country. By using such norms you can also tell how much your class has improved over a given time.

In applying the norms to your group you will need to know the group from which the norms were obtained. With achievement tests, it is also important to know the month in which the norms were obtained. Norms based on a test given in May would be different from those based on a test given to the same group in the previous October. Most manuals will give the information on both these points.

Norms for achievement tests may come in the form of the age scores, percentile ranks, or standard scores already discussed. They may also be reported as *grade scores*. By consulting the gradescore table, for instance, you may find that a raw score of 87 is equivalent to a grade score of 9.1. A pupil who gets this score is doing about as well as the average child who has spent one month in grade 9. A grade score of 9.9 would mean the typical score of a pupil in the ninth month of grade 9. Since schools are seldom open for more than nine or ten months, grade scores are limited to a range of ten months in each year (say, 7.0 to 7.9). Age scales, on the contrary, range up to eleven months and may be expressed in a form such as 7–11. Apart from this difference, you will find a neat correspondence between age scores and grade scores. With each year the *average* child increases both his age and his grade by one year.

Norms, however expressed, can be very useful, provided their limitations can be kept in mind. They tell you how a student or a class stands in relation to some definite comparison group, and this is often useful and important to know. Naturally, however, norms cannot always tell you what your particular group should be expected to accomplish. For some groups the norms would be quite unrealistic, for others, much too easy.

Selecting Suitable Standard Tests The selection of a suitable standard test is probably a job for the specialist. The problems are much the same as those faced in choosing an intelligence test except that, in choosing an achievement test, the suitability of objectives is even more crucial. If you must take some responsibility for this task, try to consult one of the standard texts on psychological and educational tests. These texts give a brief analysis and critique of many of the better-known tests. For a more complete list consult *Tests in Print* (Buros, 1961). This is a most comprehensive list. It will give you the names of the tests and, when possible, will refer you to reviews of the tests that have been published in a series of *Mental Measurements Yearbooks*, also edited by Buros. If you already have some idea of the tests you are interested in, order specimen tests.

Treatment of Test Results

The results of testing are used for several purposes. Looking at the results for the whole class, you can decide how the class as a group has progressed, and how this class compares with similar classes. Looking at the individual student, you can see his progress, or lack of progress, and you can also see how his performance in any one subject compares with his own performance in other subjects. Under certain conditions (see Chapter 5) such results can supply motivation for the future, although this matter is now in some dispute. In advising the student, both you and the school counselor will make liberal use of these results. Finally, there is the grim business of marking—of securing an index to use in reporting to parents, in deciding about passing or failing, about following this program or that, or to be used in evaluating the effectiveness of a program or perhaps the worth of the school.

Seeing the Class as a Group To get a picture of the class as a group you will find the frequency distribution (see the Appendix, pp. 640–641) one of the most useful devices. If you take kindly to diagrams, you may also profit from constructing a *frequency polygon* or *histogram* for such a distribution. The distribution, with or without its graphical counterpart, gives you in one "eyeful" a picture of the range of the scores. It also shows where the students tend to pile up, and what proportion fall above or below any selected cutoff points. Two such distributions provide an excellent means of comparing your group with a different group, perhaps a normative group, or with its own status at some previous time. Whenever the information is relevant, for instance, a comparison of the two distributions will tell you whether the difference, if any, is found all

Grades as Motives

This investigation used two graduate classes in educational psychology. Each class met for 4 weeks during a summer session, the work for one being completed before the other began. In both classes students were required to submit a term paper, and to take a final examination. One class (no competition) of 49 students was told at the beginning of the course that every student would receive a "B." This grade was fixed and would not be affected by performance on either the term paper or the final examination. The other class of 59 students (competitive term paper) was told that grades would be based entirely on the term paper. The final examination was required but would not count toward the grade.

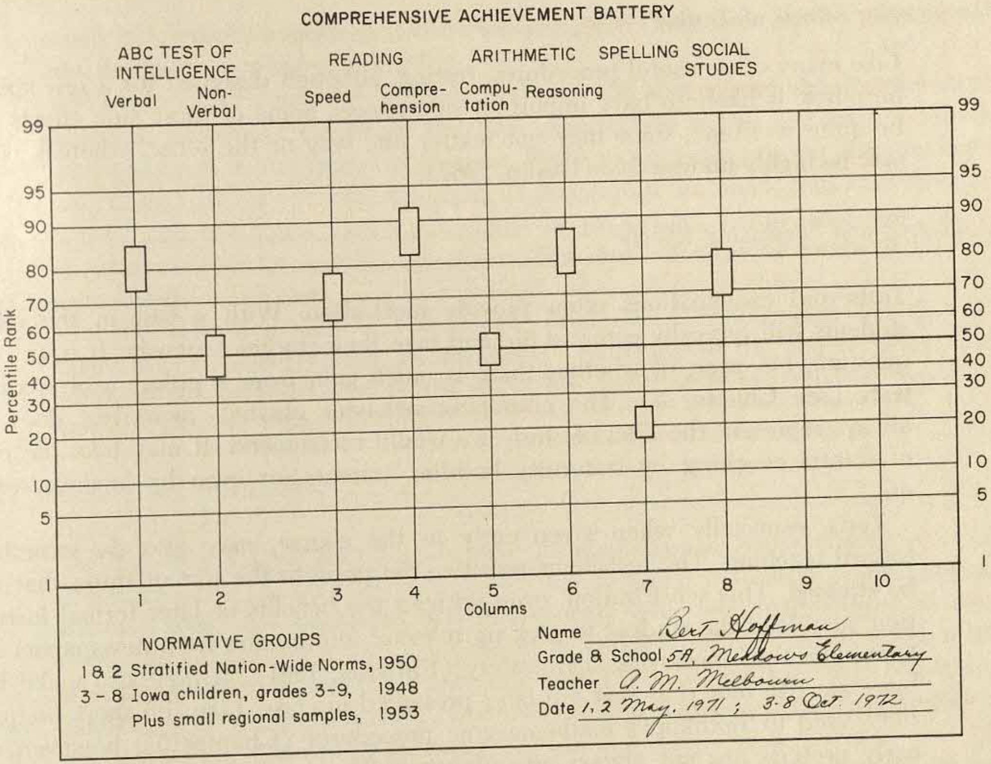
	Class with Competitive Term Paper	*Class with no Competition*
Average hours reported spent on term paper	44.5	14.6
Percentage of class handing in paper	100.00	59.3
Percentage of grades "B" or better	79.7	65.6
Mean score on final examination		
(Final examination not competitive for either group)	26.0	26.4
Student Comments:		
Difficult to feel much motivation	12.0%	29.0%
Felt that little learning occurred	6.0	17.0

In an investigation like this (in which one whole class is assigned to one treatment or the other) there is no good way to estimate whether or not the reported differences are significant.

SOURCE: D. Cecil Clark, Competition for grades and graduate-student performance, *Journal of Educational Research*, 1969, **62**(8), 351–354.

along the line or whether it is due to a few exceptional students in one group, or in one testing.

Test Results for the Individual Test results for a single pupil mean more if they can be linked up in some way with other tests he has taken. Many teachers find that the *profile* is a convenient device for this purpose. Figure 10.3 shows a hypothetical profile for a child in grade five. This happens to be given in terms of percentiles. Notice that the scale for the percentile values expands as it moves



Name Bert Hoffman

Grade & School 5A, Meadows Elementary

Teacher A. M. Melbourne

Date 1, 2 May, 1971 ; 3-8 Oct. 1972

Figure 10.3. Illustrating a profile of test performance.

away from the middle. The reason for this modification is discussed in connection with standard scores in the Appendix (p. 646). Not all profiles employ percentiles. Some use standard scores, or stanines (see the Appendix, pp. 646–648).

In this profile the student's status is indicated by a *band*, or range, rather than a single score. In making use of the band, the publisher reminds us of the inevitable uncertainty in any obtained score. The band makes use of the standard error of estimate discussed earlier. We can be reasonably sure that the true score on this test has a two to one chance of falling within the limits of the band, but we must be less certain about the student's position within the band. In the face of such uncertainty, we would be reluctant to say that this student is definitely better in reading comprehension than in arithmetic reasoning. Similarly, we hesitate to decide that he is better in arithmetic reasoning than in social studies. We would feel little doubt, however, that his performance on the verbal part of the intelligence test exceeds that of the nonverbal part.

The profile shows at a glance that the general level of performance is well above average. It also shows at a glance the difference between subjects. This student, for instance, is close to the 90th percentile in reading comprehension, but falls behind it in spelling and numerical computation.

The Broader Effects of Testing

Like many other useful procedures, testing, although designed for a few specific purposes, is likely to have important side effects. Some of these side effects may be quite welcome, some may not matter one way or the other, whereas others may be highly undesirable (Goslin, 1967).

Motivating and Sensitizing Effects

Tests and examinations often provide motivation. With a test in the offing, students will typically come to life and take their studies seriously. It is an open question, however, of whether there is much gain from a program of frequent tests (see Chapter 5). The cramming behavior elicited, moreover, does not always represent the kind of study we would recommend. It may take the form of frantic coaching by fraternity buddies, parents, or even by anxious teachers.

Tests, especially when given early in the course, may also do something toward teaching. The test items sensitize the pupil to the sort of thing that will be stressed. This sensitization, even without the benefits of later formal instruction, may lead the student to pick up relevant information from newspapers and television, thus improving his mastery (Entwisle, 1961). It may also make him more alert to materials that are later presented in class. Like the short prequestions used in Rothkopf's mathemagenic procedures (Chapter 5), however, the early pretests are not always advantageous. They may focus attention on the precise wording of the prequestion and thus handicap the student when he encounters the same idea expressed in different form (Peeck, 1970). It is possible, moreover, that a pupil, in making a wrong guess on such a pretest, may feel defensive about his decision and may resist attempts to change it.

Distortions of Emphasis

Tests not only sensitize the student to certain topics. They focus tremendous attention on the process of testing and on the areas that lend themselves to testing. To a great extent our whole educational approach may become examination-centered, and it may seem that the great thing is not to learn, but to pass examinations. This may be brought home to the beginning teacher when in the hope of clarifying some intrinsic problem, he asks, "Are there any questions?" Like a dash of cold water comes the inevitable response, "What will we be held for in the next examination?"

This emphasis on examinations, rather than on essential content, spreads to entire subjects. The courses or areas susceptible to testing are taken seriously. Others are treated indulgently or neglected. Teachers, themselves, are not wholly immune to this pressure. Unless we keep our basic objectives vividly in mind, we may find ourselves teaching what is testable to the neglect of what we really think to be important. Unless we are careful, we may let the forthcoming test determine our actual objectives.

We cannot, of course, completely dethrone the test. We might do something, however, to correct the belief that the examination is the key feature around which the rest of the program revolves. Perhaps we can point out that testing is something that may or may not occur depending on the needs that may develop. Some teachers suggest, "Let's just enjoy the project for a time, and *then* decide about the need for a test." At times some less stressful alternatives may be substituted for the test.

At the risk of preaching, the teacher might occasionally point out that the easily tested subjects, although important (especially in the course being studied), are not the only important areas of life, and that other activities may have higher claims for human regard.

Risks of Anxiety and Humiliation

Testing, as everyone knows, can have pronounced emotional effects. A whole literature (see Chapter 16) has grown up around this notion of test anxiety. Bloom (1969) has suggested that this concern over test anxiety may be overdone, and that taking a test is not always a soul-searing experience. Some of the effects may be quite transitory and may even be mixed with feelings of pleasant challenge and accomplishment. But there are real dangers, depending largely on the use to which test results are put.

For older students especially, the examination in the offing symbolizes and brings home the authoritarian aspect of teacher-pupil relations. However democratic things may be in discussion or "rap" session, the situation changes during examinations. When testing time rolls around, the teacher holds the cards. Further humiliation may come from the sheer invasion of privacy that testing involves. This may turn to acute resentment if it is suspected that we have no legitimate need to test, that we are merely prying into the lives of others out of curiosity.

These unfortunate emotional effects are likely to be much more pronounced when great issues are at stake, when the results mean pass or fail, or become a part of a permanent record, or when they may lead to a report that will distress one's parents, or when they result in a label (dull versus bright) which reflects on one's basic worth as a person. Distress from examinations is also likely to increase when students know they are being marked "on the curve." Here someone is foredoomed to a poor performance.

Do what we may, a certain number of crucial decisions will continue to hinge on the results of tests. The driver's license must be awarded or refused. College admission may be granted or denied, diplomas issued or withheld. Parents and prospective employers must be given candid reports.

But perhaps large-scale decisions could be made to loom less large in the teaching process. By going to some trouble, we could place more emphasis on the mastery of a multitude of smaller objective criteria. When these criteria and their minimum standards, as described earlier, are clearly specified, the student can hope to get credit for them through his own performance. His success will not be endangered or minimized by the superior performance of his classmates. With these criteria, no one is bound to fail.

Does It Help a Student To Tell Him His Aptitude?

College students were classified into those who had done well and those who had done poorly in previous classes. Both the high-achievement and low-achievement students were given a test announced as being a good predictor of achievement. One-third (12 students) of the high-achievement, and one-third of the low-achievement groups were then told that they had high aptitude, 12 students of each group were told that they had low aptitude, and 12 from each group received no information. All groups were given a content examination at the end of the course.

	Scores on Final Content Examination		
	Low-Achievement Group	*High-Achievement Group*	*Both Groups*
Students receiving report of high aptitude	39.6	42.0	40.8
Students receiving no information	37.5	45.9	41.7
Students receiving report of low aptitude	35.0	47.7	41.4

Differences in the last column were not statistically significant. There is a significant difference (interaction) between the trend for the low-achievement group and the trend for the high-achievement group.

SOURCE: Robert S. Means, and Gladys H. Means, Achievement as a function of the presence of prior information concerning aptitude, *Journal of Educational Psychology*, 1971, 62(3), 185–187.

When the tests consist of clearly specified objectives, the student can often do his own testing. Many commercial materials permit the student to test himself, and to find out whether or not he has met a particular objective. If he "passes" he quietly goes on to the next card, or the next assignment. If he "fails" he mutters softly, and quietly tries again, voluntarily seeking help when really baffled. This procedure is an essential aspect of teaching machines and computer-assisted instruction. In these small-scale tasks, the disaster of failure is less shattering. Both success and failure can be accepted in much more wholesome and objective fashion. The authoritarian hand of the teacher, although still there, may seem less offensive. It may also be an excellent thing to give students more responsibility for making their own evaluations and for keeping their own records of progress.

In keeping with this advice to avoid stressful decisions that are not really necessary, many educators suggest that we refrain from trying to be too precise. Often we need say nothing more than "satisfactory," on the one hand, or, "try again," on the other. Even the inevitable crucial decisions often come down to a simple pass or fail.

The student must live with the fact that some test results will become part of the permanent record. Typically, however, it will be a long time before the file is closed. The record can be extended and supplemented, even if it cannot be erased.

Resentment over Possible Bias

The humiliation or resentment produced by testing is all the more distressing in that much of it comes from an unnatural switch in values. Tell a man that because of some defect he can never adequately express himself in the rhythm of the dance, and he may sadly, but quietly, agree. Suppose you tell him, however, that he shows up poorly on an intelligence test and may thus have trouble with quadratic equations, and with other esoteric academic matters. By such an announcement you bring shame and anger to him, to his family, and to his compatriots. In one view (Stephens, 1967) this means that the school has oversold its important but limited concerns. It has seemingly convinced student body and general public alike that his inability to master its special areas is more to be pitied and deplored than inability to express himself in song, or to offer emotional support to those around him.

The humiliation or resentment felt by certain groups over the poor showing on scholastic and intellectual tests is made all the more intense by the feeling that the tests themselves may be unfair. This suspicion applies particularly to tests of intellectual ability. In attempting to estimate such general ability, we really determine, as pointed out earlier, how successful the child has been in mastering familiar tasks that he has already encountered outside the school. We ask if he can tie a knot, point to his nose, or tell the meaning of common words. Obviously this can be a test of ability to learn only if he has had a reasonable amount of experience with these simple tasks. At least it is assumed that any existing handicaps will balance out. One child may never have encountered the problem of tying knots, but it is assumed that his classmate may be lacking in some other experience necessary for another item on the test.

For many years these assumptions have been vigorously challenged (see

Chapter 3). Children from less favored neighborhoods are held to lack the experience demanded by a great many items on the tests. Middle-class children are handicapped for very few items. This *cultural bias* applies not only to the individual items in the test, but to the whole attitude regarding test-taking in general, and to the reasons for wanting to do well on the tests, and perhaps to the cultural or racial attitudes of the person giving the test (Sattler, 1970). It is important to remember, in this connection, that it is the racial attitude of the tester and not his actual race that seems to count. In testing young black children, the tester's race has been found to have less influence than his general effectiveness as a teacher and general success in dealing with young children (Yando, Zigler, and Gates, 1971). Even so, however, if the testers of lower-class children tend to be deficient in attitude or effectiveness, we would have no mere random inaccuracy, but a persistent bias in the tests which systematically underestimates the potential of children from less favored neighborhoods.

There have been many attempts to reduce the cultural bias in tests of intelligence. These attempts make use of items presumably familiar to lower-class children (Davis-Eells Games Test), or presumably equally novel for all children (Raven Progressive Matrices Test), or equally familiar to all children (Goodenough-Harris Drawing Test). One approach, directed particularly to predicting success in a vocational program (Freeberg, 1970), makes use of items from work patterns familiar to most students. As yet, however, there has been no convincing solution which greatly improves our ability to predict the scholastic performance of children from less fortunate backgrounds, or which provides better warrant for the less justifiable enterprise of passing judgment on the basic powers of such children.

The Illusion of Finality

Few of us have much tolerance for what Huxley calls "the adult burden of incertitude." We crave to know "the real answer." And when we encounter the glossy, published tests with all their intricate statistical trappings, and when the needle of the test-scoring machine swings to one number, and to one number only, we are tempted to say, "This is the answer." From what has been said before, of course, we must realize that this is not *the* answer. It is an *estimate* of the answer, perhaps a good estimate, perhaps terribly wide of the mark, but always an estimate.

It is one of the agonizing facts of life that we must make decisions, and sometimes crucial decisions, on the basis of these imperfect scores. Even when we are forced to do this, however, it helps to keep the uncertainty in mind. If you are completely confident that you should take this fork in the road, to use one example, you may pay little attention to later cues or signs that come along in the next few miles. If you are keenly aware of your uncertainty, however, you will be eagerly on the lookout for the slightest sign that could confirm or correct your choice. Whenever circumstances permit, we should similarly regard any test score as an estimate of the child's true standing and should remain open and eager for later information that might modify that estimate.

Effect of Teacher Expectations According to one provocative study (Rosenthal and Jacobson, 1968), any initial assessment of a pupil that is unhesitatingly accepted by the teacher can become a self-fulfilling prophecy. If the teacher has been led to believe that a child is dull, he treats the child as if he were dull (Brophy and Good, 1970), and because of this treatment the child will turn out to be dull. If the teacher had been led to believe that the same child was bright, the child would later show up as being bright. As you might expect, the evidence for this claim has been vigorously challenged (Clairborn, 1969; Barber and Silver, 1968), and the issue is still very much in doubt. Even so, however, there has been some advocacy that intelligence testing be abolished, or that scores be kept from teachers. Rather than resorting to such enforced ignorance, we could meet this threat, if it is shown to be genuine, by persuading teachers to avoid the illusion of finality and to take a more intelligent attitude toward intelligence test results.

Menaces and Values: Résumé

Even under ideal conditions, testing presents some problems. And in the hands of people who do not understand its limitations and implications, testing can be a serious menace. As we have seen, a single test score can be vested with a terrifying but unwarranted impression of finality. We may eagerly embrace the illusory certainty of a definite score and leave the student so labeled for years to come. Unless we are on our guard, moreover, tests may intrude into the very objectives of teaching. We may find ourselves teaching not what is important, but what is testable. And since it is so often easier to test for trivia than for grand concepts, our real *de facto* goals may deteriorate into trivia. Testing with its seemingly precise and "scientific" scores may enhance the cruel "snob" value which exalts academic and intellectual performance over accomplishment in other important areas that are less easily tested. In the minds of some students, the test or examination may symbolize the ultimate weapon of the autocrat. And there is always the danger that, with these pretty new "binoculars" lying ready to hand, we may occasionally go in for unwarranted prying into the lives of others when we have no professional need to do so.

Although some of these evils are inevitable, most of them come, not from the essential nature of tests, but from their misuse. With a little understanding, most of these menaces can be reduced to the level of minor irritations. The menaces that lie in the improper use of tests, moreover, should never blind us to the tremendous values to be had from the sensible employment of these measures (Ebel, 1964). Without them we would lack precision in our sense of accomplishment. When it comes to deciding who shall be enrolled in an educational program, moreover, tests, for all their seeming tyranny, are less objectionable than mere parental income or straight social class. For many purposes, educational tests have much to offer if we make sure that their limitations and dangers are kept in mind; that the tests are used only when necessary to make decisions that are really necessary; and that they are not allowed to usurp the major functions of teaching.

Summary

Teaching continually calls for some effort in estimating aptitude and success, and in evaluating the measures obtained. Tests are used to determine entering status, to determine the need for special procedures (formative), to make judgments of success or failure (summative), and to judge the effectiveness of administrative procedures. In these activities teachers may carry the chief responsibility, or may assist others.

Test results may stress the tasks mastered (criterion-referenced), or the pupil's relative standing in a general task (norm-referenced). In either case the tests should be valid, as judged by one method or another. Reliability is important, especially in deciding about individuals. When unreliability is known to exist, steps can be taken to deal with the problem.

Entering behavior or readiness for instruction is indicated by general inspection, and by intelligence tests, now the subject of much controversy. These should be regarded chiefly as *estimates* of future performance. Individual tests are more accurate, especially for young children. Group tests serve well. Test results are often translated into age scores, quotients (IQ), or percentile ranks. Readiness is also indicated by the mastery of the subordinate skills needed for the task to be taught. These are often expressed in a formal Gagné-type hierarchy.

In testing accomplishment, it is important that objectives be clearly specified, ordinarily in terms of observable behavior. Only observable behavior can be tested. Performance on observable proximate objectives may be used to indicate mastery of more general ultimate objectives. The actual tests may be of the constructed essay type, or may be objective questions. Each type is useful for some purposes. Although fairly easy to construct, essay questions often require elaborate procedures for dependable scoring. Objective examinations are easy to score, but must be constructed most carefully to avoid concentrating on details and to keep the elaborate mechanics from dominating the test. When fitted to the class objectives, standard tests offer many technical advantages, including norms.

Tests may have effects over and above those primarily intended. They may motivate a student to learn, or may upset or depress him, leading him to emphasize test-taking rather than learning. Some unpleasant effects may be reduced by arranging objective conditions in which the student tests himself. Humiliation or bitterness over a poor performance becomes more marked if the tests are considered biased against low-scoring students. Teachers may read too much finality into test results, and this may lead to an unfortunate attitude toward low-scoring pupils. These problems should be recognized and attacked, but they should not lead to casting tests aside in favor of unrestricted general impression.

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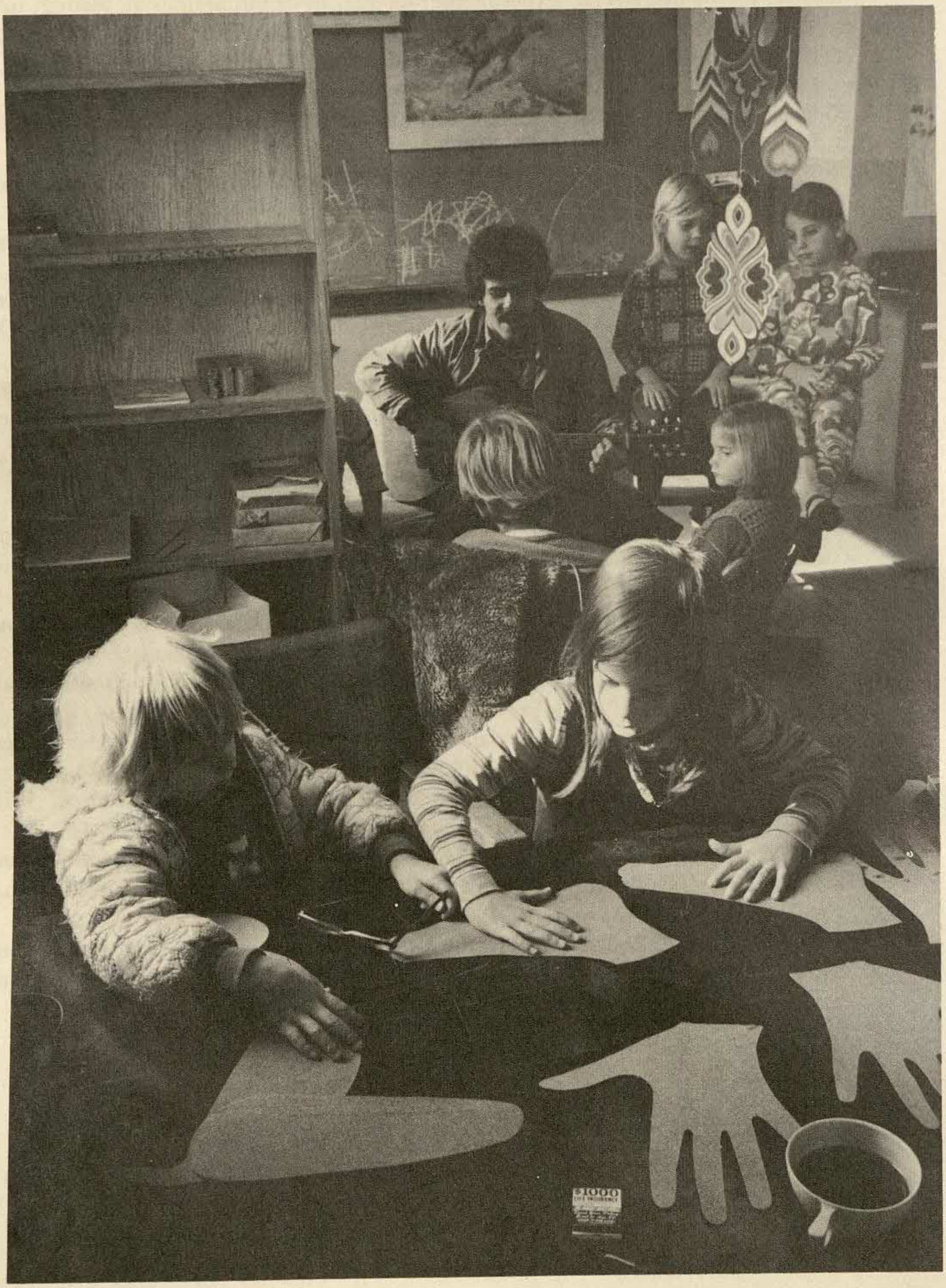
Suzanne Szasz



11

Diversity in the Classroom: Individuals and Special Groups

Under any circumstances we can expect to find a wide range of differences within any one classroom. In Figure 11.1, for instance, we see distributions of reading scores for pupils in grades 7 and 8. Some of the grade 7 pupils are reading at the level of grade 4. Others match the scores of the typical pupil in grade 10. The range of differences in grade 8 is almost as large.

The range of differences, discussed in Chapters 2 and 3, holds for all levels. In the kindergarten classes some children can master a simplified reading program in 200 trials, whereas others will take over 2500 trials for the same material (Watson, 1971). The verbal skills of children in grade one range from those of the four-year-old to the skills typical of the child in grade 3. In grade 12 we find students who are performing at the level of grade 6 pupils, and others who excel the achievement of college seniors (Learned and Wood, 1938).

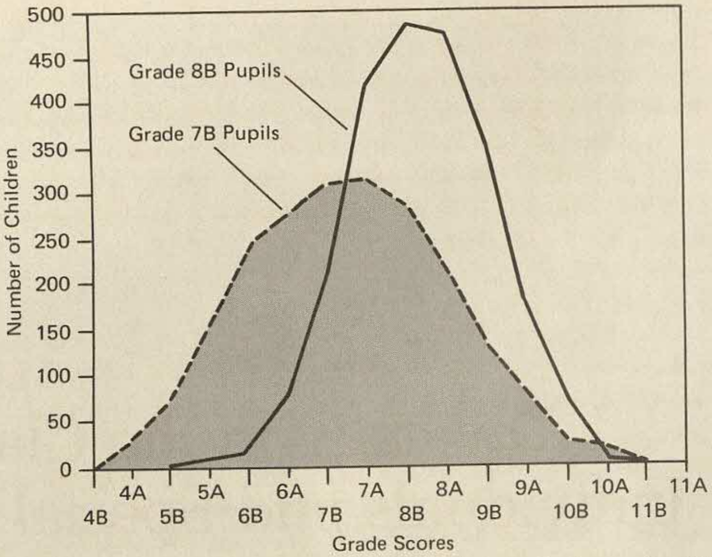


Figure 11.1. Distribution of grade scores in reading for pupils in grades 7B and 8B.

Differences, of course, are not confined to academic or intellectual abilities. Our pupils differ widely in health and energy, and in the interests, ambitions, and aversions they bring to the classroom. They differ in the backgrounds which not only affect their present performance but which will have a profound influence on their attitudes toward new work, and on their ability to cope with it.

Types of Differences to Be Recognized

Of all the differences that we will encounter there are a few that have attracted much attention in educational circles. Much effort has been put forth to take account of these differences—to acknowledge their existence, to honor the special talents, and to deal sympathetically with the special problems.

The Uniqueness of Each Individual

When we think of the many traits in which students may differ, and the extent of the differences in each trait, we must be impressed by the overall uniqueness of each student. No two could ever be alike. In the classroom situation, of course, it is too much to ask that we do complete justice to the unique and total person to be found in each of our students. But we must agree with the humanistic psychologist in his insistence that we honor and respect this individuality, that, at least we try not to diminish it, and that, whenever possible, we lead each student to relish his own distinctiveness and to welcome the interaction of his unique self with the other equally distinctive selves he finds around him.

Students with Special Talents

There is much concern about the student with outstanding intellectual abilities and those who have promise for the creative arts. In promoting the claims of diversity, many psychologists would urge us to encourage the development of talent in art, music, dance, and in social activity (Wallach and Wing, 1969; Heist, 1968). They fear that such talents have been ignored and that the more traditional academic abilities have received disproportionate support.

Groups with Labeled Handicaps

Handicaps, like talents, are always individual. Some difficulties are so prevalent, however, that individuals suffering from them are classified and labeled. Such widespread difficulties are likely to be acknowledged within the educational system, and some specific provision made to deal with them. We refer to students having such physical handicaps as poor vision, poor hearing, debilitating illnesses, conditions that prevent normal use of arms, legs, or speech organs. Mental retardation has long been recognized, and many elaborate facilities have been provided to aid the children so handicapped.

The Disadvantaged Child In earlier discussions we have made much of the disadvantages encountered by the ghetto children and by certain other minority groups. Such children have frequently been found to suffer from language deficiencies (Chapter 2). Often they fail to do well on the typical intelligence test (Chapter 3). In these earlier chapters we have considered possible reasons for these difficulties, including the possibility of inadequate measurement (Chapter 10), and have mentioned some of the efforts made to correct them. At this point we consider the classroom diversity introduced by these difficulties, and the steps that might be taken to deal with the difficulties.

Along with urban ghetto residents—often black or Puerto Rican—we find many rural children who have difficulty in adapting to the regular classroom program. Among the latter are some American Indians, migrant workers of Hispanic parentage, and the children from impoverished, isolated regions.

It is for the disadvantaged child—especially the disadvantaged black child—that many of the special or supplementary administrative programs, discussed below, have been devised. Indeed, the mammoth efforts involved in racial desegregation and in the contentious busing issue were largely administrative responses to the need for dealing with the problems encountered by minority groups.

Underachievers Lack of capacity or background disadvantages are not the only problems we face. The *underachiever* is considered to have the potential to do well in school. So far as we can tell he suffers from no clear-cut deficiency in his background. Yet he regularly fails to live up to the potential he seems to have. We say "*seems* to have," because there is a possibility that the problem may lie in the estimate of his potential (Chapter 10). It may be that this estimate is in error, and he really does not have the potential that has been attributed to him. If this is true, we would, of course, lament both the lack of potential and the limited achievement, but we would not classify him as an underachiever.

Whatever the possibility of erroneous estimates of potential, we do have a

Does Counseling Help the Underachiever?

Four counseling sessions were arranged for 69 gifted but underachieving high school students (sophomore year). The students met once a week in groups of 5 to 15, headed by regular school counselors. These students were matched with a group of noncounseled students on school performance, attitude, attendance, and deportment. All students were tested at the end of both the sophomore and junior years.

	Sophomore Year		*Junior Year*	
Measure	*Counseled*	*Noncounseled*	*Counseled*	*Noncounseled*
Grade point average	2.1	2.1	2.3	2.2
Knowledge of effective study methods	48.5	47.3	47.9	48.0
Number of students exceeding nine absences	27	42	26	51*
Number of students referred for discipline	12	28	21	33

* This is the only significant difference in the table.

Teachers rated the counseled students significantly less resistive and more cooperative in the classroom at the end of the two-year period. California Psychological Inventory differences at that time also favored the counseled group on such factors as social poise and independence of thought and action, but there were no group differences in social conformity or maturity and responsibility.

SOURCE: B. C. Finney and Elizabeth Van Dalsem, Group counseling for gifted underachieving high school students, *Journal of Counseling Psychology*, 1969, 16, 87–94.

substantial number of pupils who fail to reach their *apparent* potential. Underachievement is one of the categories of pupils in trouble, and the problem of underachievement has received a great deal of study.

Underachievement is all too often a fairly stable characteristic of the individual pupil. Those destined to become underachievers reveal their difficulties quite early. For boys, the pattern becomes evident by grade three; for girls by grade five (Shaw and Grubb, 1958). More boys than girls, by the way, become classified as underachievers.

The underachiever with his average or better-than-average IQ (Raph, Goldberg, and Passow, 1966) is seldom the product of the ghetto or the underprivileged neighborhood. Typically, however, he comes from a home that has more than its share of emotional problems (see Chapter 12). The parents are anxious, authoritative, worried about morality, and critical toward their children. Many of these parents have little regard for the kind of achievement stressed by the schools, or dismiss this sort of achievement as something that is not for them (Granlund and Knowles, 1969; Hilliard and Roth, 1969; Shaw and Dutton, 1962). Remembering the problems of drawing conclusions from such *ex post facto* information (Chapter 8), we will be cautious in deciding what causes what. The same forces that soured the parents in the first place may also have discouraged the children. The lack of achievement in the child may have made the parents bitter. But there is also the possibility that a negative attitude in the home may definitely discourage the pupil.

Taken as a group, underachievers are also more disorganized and lackadaisical in their attitude toward schoolwork. They are more easily distracted and less able to plan ahead or to concentrate on a complex problem. Many of them give the impression of expecting to fail and of being somewhat reconciled to this fate (Shaw, 1968; Smith, R. B., 1968).

Rival Claims of Diversity and Conformity

In the discussion of groups who fall below the norm, we reveal a desire to bring these pupils closer to the average and thus reduce this aspect of diversity. There are other ways also in which we will work against diversity and try to secure a measure of conformity. We will try to make sure, for instance, that all our pupils will give the same answer to 8 + 6, will spell "pleasant" by the same succession of letters, and will keep to the same side of the street when driving a car.

But it would be a great mistake to think of this inevitable variation and diversity merely as a problem with which we have to contend. This diversity, on the contrary, is a valuable and challenging thing. It gives us an opportunity to help develop a number of individuals, each with his own unique potential and each valuable in his own way. In this sense our problem is not to escape a distressing evil, but to take advantage of an opportunity and to help each of these diverse children to reach his capabilities.

Administrative Arrangements

Theoretically, there are many possible methods of dealing with diversity. To help the teacher both to deal with the difficulties and to exploit the opportunities presented by differences in children, we could, of course, arrange for completely individualized instruction. In this approach each child is taught on his own and, in the process of teaching him, there is no need to worry about children who are different. Group activities are introduced at times for their desirable effect on this individual, but never merely to simplify the process of instruction.

Throughout history much instruction has been carried on in this way, and highly individualized methods are not infrequent today (Anderson, 1962). By and large, however, such programs are the exception, and most teachers will be expected to teach a whole class at one time. Under these circumstances, the school administration typically takes a hand and employs one or more devices to help deal with the problem of individual differences. Such devices, of course, are never intended to eliminate individual differences—nobody would want that—but are designed to reduce such differences to a range that can be managed by the typical teacher.

In many of the administrative arrangements for handling individual differences there are important psychological implications. From some 35 different arrangements that have been proposed (Shane, 1962), we select those that have most significance for the psychologist in his study of education.

Separate Programs or Institutions

At one extreme, special schools have been established to take care of the extreme ranges of differences. In other arrangements we see separate programs set up within a school. Separate schools are frequently established for the exceptionally dull child, and occasionally for the exceptionally bright child. There are also many separate schools for children with various physical handicaps, especially for those handicaps which call for special medical care or physical therapy during the day. Other schools are provided for children who are emotionally disturbed or in need of special psychiatric treatment.

For some types of defect or deficiency such separate programs seem clearly necessary. Often the deficiency so dominates the situation that ordinary instructional procedures cannot be used. There has been more argument, however, about special schools or arrangements for the exceptionally able (DeHaan and Havighurst, 1961). Such schools may seem undemocratic, and may threaten a loss both to the students who are sent to the special school and to those who are left. The success of such programs is difficult to judge. Students going through them give a favorable report. Many of them, indeed, feel that the program could have been even more demanding (Klein, 1958).

Student Attitude Toward Special Programs for the Gifted

Of some 200 honor graduates from a large high school (Evander) in New York City, 77 were interviewed and another 74 answered a questionnaire. Those who did not go to college were not included. Of these 151 students, there were 41 boys and 110 girls. (There were more girls, 3 to 2, enrolled in the school.) One girl out of every 22 enrolled made this honor group, whereas only one boy out of 39 did so.

Of these 151 honor students, 51 had IQs less than 120, another 50 fell between 120 and 134, and the remaining 50 were over 135.

In this high school all promising students were involuntarily assigned to an honors program. As it turned out, each of the 151 students had had some experience in such a program.

	IQ Level		
Attitude Toward Being in the Honor Program	*Below 120*	*120–134*	*Above 135*
Enjoyed being in the program	88%	98%	85%
Would have made some effort to get in	66	78	66
Honor class resulted in too much work	4	4	2
Honor class should have been more demanding	20	29	21
Nonhonor classes easy to point of boredom	68	79	70
Some honor classes boring because too easy	22	40	45
Honors program led to occasional conceit or snobbishness	14	8	19
Felt some resentment from other students	36	38	36

SOURCE: M. M. Klein, What honor students think, *High Points*, 1958 (March), **40**, 5–32.

Supplementary Programs

In recent years there has been much use of supplementary or compensatory programs. Head Start, with its debatable effects, has already been discussed (Chapter 3). For the disadvantaged adolescent, especially for the black adolescent, programs such as *Upward Bound* have been devised. Upward Bound is intended to provide motivation for more education and to increase the proficiency needed for higher education. The results of this most recent innovation are difficult to assess. One evaluation of a program extending over two summers

(Hunt and Hardt, 1969) reports considerable gain in self-esteem and in the belief that one has much control over his own success. But there was little gain in academic achievement.

Other administrative attempts to promote the achievement of the disadvantaged have called for staffing the classroom involved with teachers specially selected and specially trained for this task. The special qualifications include not only the necessary skills, but an attitude that accepts and values many of the differences that are encountered. In some programs there is an attempt to secure teachers who are members of the prevailing minority group.

Special sessions of group guidance are often provided for children who share common problems such as underachievement, lack of motivation, or inadequate self-esteem (Finney and Van Dalsem, 1969; Klein, Quarter, and Laxer, 1969). Typically, such programs report mixed success. Some fail to effect any improvement in either personal adjustment or academic success. Others report modest success in one or the other of these areas.

Some of the supplementary programs have concentrated on one or two facets of intellectual performance. One of these has reported considerable success (Blank and Solomon, 1968). In one investigation at the college level (Smith, G. M., and Fogg, 1969), students with inadequate background were assigned to a "residential college" featuring individual attention and individualized remedial programs. The general results suggest some success.

Teaching in many of these programs calls for teachers with special interests, abilities, and training. Teaching the severely retarded child calls for exceptional dedication. Teachers lacking such dedication, but arbitrarily assigned to these classes, often feel persecuted and resentful.

Homogeneous Grouping

Some form of ability grouping or streaming is the most familiar device for reducing the range of differences within a class (Cochran and others, 1961; Shane, 1962). At one time, children were grouped simply by intelligence test scores. More recently, however, the grouping has come to be based on previous achievement and on general performance in the classroom. Experiments attempting to discover the advantage or disadvantage of grouping have produced a conflicting and confusing pattern of results (NEA, 1968; Borg, 1965; Pattinson, 1963; Ekstrom, 1961). Certainly we cannot say, with any confidence, that children learn any more or any less when grouped according to ability. There is some suggestion that ability grouping may bring less wear and tear on the teacher. But such a system naturally means that someone must be chosen to teach the slow-learning group, and many teachers resent this assignment.

Whatever the advantage of ability grouping, we should never expect it to solve all our problems (Goldberg, Passow, and Justman, 1966). For one thing, the correlation between children's performances on any two tasks is never perfect. If children were closely grouped for today's lesson, we could not be sure

Difficulties in Getting Groups That Are Really Homogeneous

Pupils in grade five were grouped according to overall reading scores in the Iowa Silent Reading Test. The total range before grouping was from a grade two level to grade nine level. After grouping there were from 18 to 29 students in each class.

The table shows the range found in the overall performance of each group. It also shows the range on various subtests. Notice that the groups were so arranged that there is very little spread (about two grades for the most part) on overall reading. On any particular subtest, however, the range for each group is quite large, and there is much overlapping between groups.

	Overall Reading		*Range of Scores in Certain Subtests*			
Groups	*Mean*	*Range*	*Rate*	*Comprehension*	*Word Meaning*	*Sentence Meaning*
A (Best)	6.7	5.7–9.0	2.1–12.7	3.8–11.1	4.5–8.5	4.4–10.3
B	5.2	4.6–5.6	1.8–12.7	2.5–11.1	2.9–7.9	2.9–8.4
C	4.0	3.6–4.6	1.8–12.7	2.0–6.5	1.9–6.1	1.9–7.5
D	3.3	2.0–3.6	1.8–7.4	2.0–6.0	1.9–3.8	1.9–9.5

SOURCE: I. H. Balow, Does homogeneous grouping give homogeneous groups? *Elementary School Journal*, 1963, **63**, 28–32.

that they would be so closely grouped for tomorrow's lesson in the same subject. They would be even less closely grouped in a different subject, or in a lesson studied much later.

Tyler (1962) gives an interesting illustration of what happens even when pupils are narrowly grouped, and when as many as three separate criteria are used for the grouping. To be selected for the upper group, the seventh-grade pupils in his example had to be above 120 IQ, had to be able to read paragraphs at the grade nine level, and had to show grade nine ability in arithmetic reasoning. Yet in such closely related things as reading isolated words or in arithmetic computation the group showed wide dispersion, ranging from grade six to grade eleven performance in word meaning, and from grade seven to grade eleven performance in computation.

From these results it is clear that pupils closely grouped on one kind of ability will be found to vary considerably even in a closely related ability. When we turn to traits that are less closely related, we can expect a much wider range of differences in our "homogeneous" group. With respect to interest, for instance, or motivation or social adaptability, our homogeneous group would vary almost as much as any ungrouped classroom. The moral is clear. Grouping may reduce the range of differences in one or two characteristics, but it never completely eliminates differences even in those characteristics and may have almost no effect on other important characteristics.

Acceleration and Selective Promotion

By permitting able pupils to move forward at a more rapid rate, we will automatically do something to produce classes of more uniform academic ability. Theoretically, such a policy would make sure that all the pupils who were ready for grade four would be placed in grade four no matter what their age.

Selective promotion, when used, should have a somewhat similar effect. If this were practiced it should mean that the only pupils going on to grade four would

Does It Pay to Get an Earlier Start in Reading?

Of some 5000 pupils entering grade one in a California school system, a total of 49 were already able to read. Their skill in reading ranged from grade one level to midway between grades four and five.

Twenty-five of these pupils were available for study toward the end of grade three. To get a control group, a search was made of all the nonreaders at entrance who had taken the Stanford Binet test. From these a group was selected who approximated the early readers in intelligence.

A further study also revealed that the early readers were regularly further ahead in the specific ability of reading than in general mental development.

	Early Readers	*Control Group*
Number of Cases	25	201
Median IQ	114.8	110.2
Range in IQ	91–161	70–191
Reading score toward end of grade 3	5.0	4.3

SOURCE: Dolores Durkin, An earlier start in reading? *Elementary School Journal*, 1963, 63, 147–151.

be those ready for that grade. In actual practice, however, these theoretical gains do not appear (Cook and Clymer, 1962). Selective promotion means, of course, that some pupils will *not* be promoted. This matter of nonpromotion raises other questions, and these other issues may be much more important than the mere problem of reducing the range of differences.

Acceleration of bright children can be accomplished by permitting bright children to enter school early (Reynolds, 1962), by the simple use of double promotions whereby a pupil moves directly from (say) grade two to grade four, or by providing a special program whereby the able students accomplish more work in the same time (Rush and Clark, 1963). For the most part, these programs have worked fairly well (Klausmeier, 1963; Shannon, 1957). The accelerated children tend to excel their intellectual equals who were not accelerated, and they show few, if any, undesirable effects (Braga, 1969). It is true that there have been some reservations about the early admission programs (Halliwell, 1966) and this is not surprising. Preschool tests are not as accurate as those used later on, and some children admitted on the basis of these tests may not have been ready for the kind of instruction planned for them. Such admission is also complicated by parental wishes. Even so, the criticism is not that early admission is harmful, but that the accelerated children do not show a proportionate advantage over their intellectual equals who enroll at a later age.

From the teacher's point of view, early entrance and other forms of acceleration present some problems, and Braga (1969) found teachers opposed to early admission. Double promotion also complicates things. A child in grade four who has skipped grade three may need coaching in some of the important details he has missed. He may also need support while he is struggling with things that others understand and he does not. It is often surprising, however, to see how quickly bright children tend to correct these situations and catch up without any prolonged lag. Acceleration also poses other problems. At times, acceleration makes sense only if there is an intelligent follow-up. There is little point, for instance, in having a child study French conversation at an early age if he is not going to have the chance to continue this study for a reasonable period of time.

Team Teaching

In addition to its hope of reducing the many conflicting roles that the teacher must play, team teaching may provide one means of dealing with individual differences. Different members of the team, as seems wise and convenient, often attend to special interests, special ranges of ability, or special handicaps. Since this method can be extremely flexible it would seem, on the surface, to have many advantages over a more fixed schedule in which one teacher assumes charge of a single group for an entire year.

But these are expected advantages. The evidence so far fails to show any superiority. Some studies find no difference between team teaching and the self-contained classroom. Others find more academic growth in the self-contained classroom (Rhodes, 1971; see Stephens, 1967, p. 80, for earlier studies).

The Effectiveness of Team Teaching in Elementary School

One school in the Los Angeles area employed the practice of team teaching. One teacher aide was available for kindergarten through grade three, and another for grades four to six. Pupils from this school (147 in all) were compared with those in a comparable conventional school in the same general area. There were 138 pupils from this school. The team school had a more active parent organization, a number of the parents assisting in the schoolwork. All pupils were tested at the beginning and at the end of the year. The two groups were comparable in IQ and initial achievement.

	Improvement During the Year		
	Team	*Nonteam*	*Significant?*
Achievement in reading	14.2	17.5	Yes
Achievement in spelling	11.5	13.6	No
Achievement in arithmetic	11.6	13.3	No
Pupils' attitude to school (rated)	—0.3	—0.0	No

Teachers in the "team" school indicated a significantly more positive attitude. There was no significant difference in parents' attitude toward the school.

SOURCE: Fen Rhodes, Team teaching compared with traditional instruction in grades kindergarten through six, *Journal of Educational Psychology,* 1971, 62(2), 110–116.

The Nongraded School

In a sense, the nongraded school is an about-face with respect to the problem of treating individual differences. As mentioned earlier, the use of grades represents one of the earliest administrative efforts to reduce the range of differences within a class. But in doing this, the arrangement may have seemed to have promised too much. Teachers may have assumed that all serious diversity had been eliminated and that, this being so, the class could be taught as a homogeneous unit. Clearly that has proved not to be the case. Meanwhile, moreover, the conspicuous class boundaries have made for much trouble and distress, especially when pupils fail to hurdle the artificial barriers between classes (Goodlad, 1962).

Certainly grade labels give a misleading picture of the true state of affairs. They imply that a given child is performing at (say) grade six level in all respects. Few children would match this fictitious picture. Most children would be performing below grade six in some subjects, but well above in others. A teacher of a special subject such as art, or music, could never assume that all pupils in a given grade were even roughly comparable in his specialty. To get reasonably homogeneous groups in such special subjects, the teacher may have to reach into several different grades. Science clubs or dramatic groups also frequently cut across classes in recruiting their members.

To get away from the dangerous illusion created by fixed grades, many people would set up an "ungraded" school, arranging for a variety of groups in any one classroom. In these, diversity would be expected and highlighted and would clearly call for some deliberate treatment by the teacher.

Here, again, we must remember that plausible expectations do not guarantee experimental confirmation. An adequate test of the nongraded school will call for elaborate and sensitive experiments. The early evidence fails to find any definite advantage (Hopkins, Oldridge, and Williamson, 1965).

Classroom Procedures

After the administrator has done his best, the teacher is bound to encounter a wide range of differences within the classroom. At times he may wish this range were less. At times he may exult in the opportunity for the development of diversity. But, either way, he must deal with the diversity that he finds.

Matching Instruction and Student

• In discussing the nature of teaching we mentioned the current interest in matching teacher and child (Lesser, 1971; Thelen, 1967). Following the same line of thought, there has been much emphasis on the matching of instructional procedures to be used and the characteristics of the student being taught. It is quite possible that one kind of student will thrive on one method of instruction, whereas another student would do better with a different procedure.

It is one thing, of course, to say that students differ with respect to the instruction that suits them. It is quite another thing, however, to identify the *general* characteristics of those who will profit from one approach and the different general characteristics of those for whom this approach will not work. If we can only say, "Jane needs this, but Harry needs that," we are faced with the need of a tailor-made program for each student. If, on the other hand, we could say that boys flourish under one approach, but girls do best on another, we are suggesting a more practical approach, since we could readily assemble sizable groups for which a given approach would be suitable. Even when personality, rather than sex, is the basis for grouping, it would be helpful to know, for instance, that bright, flexible, and assertive students do well in programs calling for independent efforts (Bar-Yam, 1969; Walberg, 1969).

Recently there has been an intensive search for dependable interactions between student characteristics and instructional strategies (Bracht, 1970). Some interesting positive results appear. St. John (1971), for instance, found that black students performed better when the teacher was highly child oriented (see Chapter 1). For white students, however, the reverse was true. These children made more progress with teachers who were strong in subject matter and less oriented to interpersonal relations. But the general trend of results is less clear-cut. One unpublished review by Bracht (reported by Tallmadge and Shearer, 1971) examined some ninety studies of investigations in this area and found only five that revealed meaningful and significant interactions. Individual students, undoubtedly, respond differently to different treatments. It is, however, difficult, or at least unusual, to find systematic characteristics that call for specific approaches.

Understanding Each and Every Child

Teachers have often been urged to attempt a fairly complete understanding of each child. We are reminded that any learning that is done must be done by each child, and done within the total pattern of his interests, concerns, and abilities. From this, several writers have concluded that the teacher must have a clear picture of these forces as they operate in each child. The teacher should know each child's abilities, previous academic performance, hobbies, interests, worries, and vocational aims. He should also know much about the pupil's family and its place in the community, and certainly should know about the family attitude toward the pupil and his concerns (Nunnery and Gilliam, 1962; Prescott, 1957).

The Magnitude of the Assignment The recommendation that the teacher undertake a complete understanding of each child seems hopelessly unrealistic. The complete understanding of even one individual is exceedingly hard to come by. It takes a year or more and several thousand dollars for a psychoanalyst to attain a reasonable understanding of one person. Few parents would profess anything like a complete understanding of their own child.

When we think of the number of children with whom a teacher must deal, we must be skeptical of attaining even a moderate understanding of each child. In junior or senior high school, the typical teacher meets 156 students per day (NEA, 1963). The typical elementary schoolteacher meets about 30.

Reservations About the Need for Complete Understanding

Not everyone, of course, insists that the teacher must hope to have a complete understanding of each pupil. Highet (1950), after exhorting us to an intimate understanding of such special students as the genius, the weakling, or the off-beat eccentric, explicitly warns us against feeling responsible for knowing every single pupil that well.

The evidence on the topic, although somewhat conflicting, does not suggest that a more intimate knowledge of pupils typically leads to superior teaching. One early study (Ojemann and Wilkinson, 1939) did report some gains from having teachers learn more about their pupils. A later study (Hoyt, 1955), however, found no gains in achievement, though occasional improvement in the pupil's attitude toward the teacher. Bush (1958), after reviewing the literature, suggested that the advantage, even when present, is by no means pronounced.

Along with the studies directly attacking this problem there is some indirect evidence which must suggest the wisdom of keeping an open mind on this question. As we might expect, studies show that the smaller the class, the more the teacher is likely to know about each child (McKenna, 1957). Yet, in study after study, pupils in large classes learn as much as comparable children in small classes (Herrick, 1960; Fleming, 1959; Spitzer, 1954; see also the summary in Stephens, 1967, p. 75). In spite of the increased understanding and difference in general climate (Walberg, 1969) that are found in smaller classes, we cannot expect an observable gain in achievement. It is possible, of course, that coming to know more about a child could work either way, sometimes leading to reduced expectations, or to a feeling of hopelessness.

From the work in behavior shaping (Evans, 1971, pp. 173 ff.) we get additional evidence that a genuine understanding of the child's makeup cannot be strictly necessary for instruction. The Skinnerians make much of the fact that detailed understanding is not needed. Provided we know what will act as reinforcement for a given child—and often our first guess will hit the mark—we can dependably shape his behavior by following the general principles of reinforcement (Reynolds and Risley, 1968).

Utilizing Individual Reactions to Group Procedures

In his vaunted indifference to the private stirrings within each child, the Skinnerian behaviorist may be going too far. This may be an extreme position brought on partly by the belief that scientific principles should be completely general, but also serving perhaps as a protest. To the behaviorists and to others it may well seem that we have oversold the need for the complete and intimate understanding of the private forces at work in each of our students. Starting with an important but limited notion, we may have built it up into a fetish. As a result of this fetish, intensive individual counseling is now likely to be recommended for any child who comes up for any attention whatever, even if he should be doing about as well as could expected (Robinson, 1953).

Making a break from this individual analysis-for-everyone approach, Passow and Goldberg (1962) suggest that differences between pupils may not be our chief worry. It may be more important, they contend, to deal with the differences in the subjects of instruction. Perhaps the typical teacher, even if he takes

Should the Teacher Have Complete Knowledge of Each Pupil?

From a group of 135 grade nine students, two groups of 33 each were selected. The selection procedures resulted in the same average age, IQ, and previous attainment for the two groups.

The students in the experimental group were given a number of personality and adjustment tests. Parents of these students were also interviewed. After making a summary of the information about each student, the investigator discussed this with the teacher, and on several other occasions consulted with the teachers regarding the students in the experimental group. (The 33 students in each group were scattered through several classes, and a number of teachers were involved.)

The control group was given some of the tests, but the parents of these children were not interviewed. The results of the tests were not made available to the teachers, and there was no consultation between teacher and investigator about the control children.

	Experimental Group	*Control Group*	*Difference Significant?*
Average academic achievement at end of the year	3.2	3.0	Yes
Number of test items indicating disturbance—beginning of year	92.3	70.4	
—end of year	61.0	74.8	Yes
Teacher's rating for poor adjustment in class—beginning of year	3.3	3.1	
—end of year	2.3	2.9	Yes

SOURCE: R. H. Ojemann and F. R. Wilkinson, The effect on pupil growth of an increase in teachers' understanding of pupil behavior, *Journal of Experimental Education,* 1939, 8, 143–147.

no special pains in the matter, will do a better job in handling the range of differences among his students than in doing justice to the differences he finds between one school subject and another.

Fortunately, nature being wise, individual needs can often be met by group procedures. The manager of a cafeteria must deal with people who have a wide variety of preferences, needs, allergies, and aversions. But in planning the meal he is not required to have a complete medical file on each prospective client. He

In a different experiment at the grade eight level, in two schools, each of six teachers taught three classes. For one of these classes (Maximum Information Condition), the teacher was given a folder for each student. This provided test results, personal data, and an interpretation of the information for each student. For this class, the teacher was also urged to secure additional information about each pupil. In a weekly conference with the investigator the teacher was encouraged to discuss individual pupils in this class and to go over the data available for each pupil. For a different class (tests only), the teacher was given the test results for each student, but no additional data. At the weekly conference regarding this class, the teacher was encouraged to get help with regard to test results, but was urged not to get additional data. For the third section (name only), the teacher was given no information about the students and was urged not to seek such information. In the weekly conference he was urged again to maintain this condition.

This same general procedure held for each of the six teachers. It was so arranged, however, that any given class would be taught by one teacher (say, the teacher of mathematics) under maximum information, by another teacher under the test-only condition, and by a third teacher under name-only condition. Boys and girls of different IQ levels were so assigned that both sexes and all levels were equally represented in each class and in each condition. Each teacher, it will be remembered, taught under all conditions.

At the end of *one term* the teachers were tested to see how much they knew about the pupils. The teachers actually did know more about the pupils they were supposed to have studied.

When the total results were considered, there was no significant difference in the gains made under the different conditions. When the results were separated for subjects, the name-only condition seemed superior for English. There were no significant differences for mathematics or social studies.

Pupils taught under maximum-information condition had a better attitude toward the teacher. This effect was significant in one of two schools, and suggested in the other.

SOURCE: K. B. Hoyt, A study of the effects of teacher knowledge of characteristics on pupil achievement and attitudes toward class work, *Journal of Educational Psychology*, 1955, **46**, 302–310.

can easily meet the problem by providing a varied menu. Different people may eat different things, and even those who eat the same things might utilize what they eat in different ways.

Turning to the intellectual realm, it seems obvious that a single book or lecture or work of art, prepared without any thought of the differences among its possible patrons, often has different but useful effects on hundreds of different people. In spite of their differences, various people have each been able to get something out of the single mass of stimuli offered. But they probably get different things. From the same poem, one student may derive consolation or peace, and another an urge to go out and achieve.

Within the classroom, many of the things that the teacher may do, although carried out with no thought of the many differences among his students, may still have a valuable but different effect on most of those students. In some cases, indeed, such blanket treatment would be almost as effective in linking up with individual needs and peculiarities as a more elaborate treatment neatly tailored to the special needs of each student. To the extent that this second possibility holds, we would expect little or no gain if the teacher, by heroic exertion, had been able to know and remember each child's peculiarities and had been successful in arranging a separate approach to fit each child.

Individual Reactions Within the Class At times a single statement by the teacher may have a different effect on each pupil and yet, different as they are, each of these effects may be appropriate to the particular student. An announcement of a change in the class schedule, for instance, might well have different significance for different pupils. For some, it may come as a welcome relief. For others, it may create problems. Typically, however, we would feel perfectly justified in making this announcement, once and for all, and letting each student deal with it on his own as far as he could. We would realize, of course, that a few students could not make an adequate adjustment on their own and would need individual help. But this we would supply as the need arose. Certainly we would not abandon the group approach and insist on an individual announcement to each student.

In many situations the individual student, each in his own way, reacts usefully to group procedures. In our discussions of the role of practice, it will be remembered, we stressed the highly individual reactions that occur when a student is merely listening to a lecture or reading a book. Seldom, if ever, does each student react to a single statement in precisely the same way. Each one will respond in different ways and with different results. One student, hearing the beginning of a sentence, will correctly anticipate what is coming and will promptly be reinforced. A second student will make an erroneous guess about what is to follow. For him, the succeeding remark, already embedded in the talk or text, will act as a guide to show him what he ought to say. Here we have a fixed procedure, applied uniformly to all students. Yet this blanket procedure brings about different reactions and differential treatment. The treatment that it brings to each student, furthermore, is appropriate to his special academic requirements.

In the process of using rhetorical questions, as in a drill on arithmetic, the teacher may also find that a fixed and blanket procedure will have different, and yet appropriate, effects on different students (see Chapter 6). The instructor poses a question and pauses briefly. During the pause, different students react differently. The informed students say the answer to themselves. Some other students react with a silent error. Still others find their minds a blank. At this point, the instructor gives the correct answer. He gives the same answer to each student in the class. Yet this single undifferentiated statement has a variety of results. To the student who has already thought of the correct answer, it provides the all-important reinforcement. This same statement guides the erring students away from their wrong answer and leads them into the correct response. Finally, for that third group of students who could think of nothing, this remark on the part of the teacher supplies a response to fill the empty space.

In many other group processes each student will automatically and unconsciously react to mass stimulation in a way that is moderately suitable for him. In a group exercise in problem solving, for instance, the timid newcomer to the material may be reluctant to commit himself, even silently, and is naturally led to take a spectator role. And, as it happens, such a role has proved useful in his stage of learning. The student who has some grasp of the material will make silent commitments to himself and may vicariously share the reinforcement received by some more venturesome student who speaks out. The bolder student who announces his correct answer will be reinforced both for his correct solution and in his tendency to speak out when he thinks he has something to say.

Experienced teachers have found simple ways to maximize these many individual reactions that occur in blanket group procedures. Ask your question first, for instance, before calling on a specific student. Each student is thus led to make a silent response. Having thus committed himself, each student will share, in one way or another, the reinforcement pattern that is applied to the one who is asked to speak out.

To make sure that most individuals profit from these group exchanges, you should manipulate the tendency of some eager students to blurt out the answer as soon as it occurs to them. At one time you may suspect that most of the slower students are completely at a loss with respect to this question. In that case, permit the eager ones to explode. The answer thus emitted will provide guidance for the slower pupils who had no answer anyhow. Perhaps, on the other hand, you suspect, again on a very general basis, that the slower pupils are almost at the point of the answer. Then, wait for a moment before you yield to the forest of shaking hands, meanwhile gently shushing the more impatient ones into silence. In other circumstances, hesitations or pauses on your part may pointedly demand definite reactions from students. Sometimes by merely sweeping your eyes across the class you may remind some students that "You are in this too."

Use of Subgroups and Differential Assignments

It is comforting to realize that different students will derive different benefits from a single classroom exercise. But useful as it is we cannot expect this process to accomplish all that needs to be done. To take care of what is still left we should look for some second strategy that will do as much as possible with the minimum demand on the teacher's resources. We find such a strategy in the use of subgroups. These can be casual or systematic, persisting or transient, set up by computerized program or by a casual parenthetical remark. In developing a certain project, for instance, you may have to use one approach to interest boys and quite a different approach to interest girls. But you might expect most (not all) of the boys to respond to a given kind of motivation. This may call for a sex grouping lasting perhaps only during the turn of a phrase, or perhaps, at the other extreme, demanding separate classrooms. At other times, an approach that works for those who have been in the class for some time might be lost on students recently transferred to the class.

Many other groupings will suggest themselves. For one purpose or another, we could establish groups, temporary or longer lasting, consisting of those who are at comparable stages of physical development, who have similar physical handicaps, who have or have not been to the museum, who are deficient in certain prerequisite experiences or interests or aptitudes. In general, it will often prove more efficient to arrange for groups that are moderately homogeneous, and to use blanket procedures for these groups. Sometimes, of course, the trouble of arranging for such groups would more than offset any advantage that might be expected. It might be more efficient, for instance, to repeat an announcement individually to each latecomer than to go to the trouble of assembling all latecomers into one group.

In many cases the process of grouping can be very casual, at times consisting merely of a few parenthetical remarks addressed to one group. At other times the grouping process may call for elaborate testing or, perhaps, for the use of sociometry. At times the resulting group structure may dominate the whole situation. Under the latter circumstances, especially, team teaching might prove exceedingly valuable in giving each subgroup the special treatment that it requires.

Enrichment Some subgroups can profit from additional work and many teachers try to take care of this by arranging for differential assignments. This process of enrichment is not limited to large subgroups, of course, but could be geared to individual needs as well. Frequently, however, there will be several pupils, all of whom should profit from more work on the subject. These can be treated as a group.

As in other programs of subgrouping, these supplemental or differential assignments can often be accomplished in extremely casual fashion. "Anyone interested could . . ." "Those of you who have had chemistry should read . . ." "The people working on the 'gumshoe' project should . . ." At other times, such differentiation may involve separate reading lists or completely separate programs.

As we go further and further in the attempt to minister to individual needs, our concern for efficiency would suggest that, first of all, we try out more complex group approaches that are specifically designed to provide for a wide range of individual differences. The older project method, at one time a complete way of life in American schools, is one such approach. The students in the class undertake some task that makes sense to them, such as planning a school fair or trying to learn the factors that affect housing restrictions. In the project selected are to be found separate tasks calling for a wide range of interests, aptitudes, and degrees of preparation. In a quite natural way, each student could fit into this general project, doing something that is consistent with his interests and abilities and that might be expected to help him develop in some useful way.

Supplementary Individualized Instruction

At times, of course, we will face the need for tutorial instruction on a one-to-one basis with all the seeming inefficiency that such tuition might entail. Prior to that, however, we would be wise to take advantage of the supplementary individualized instruction that the student can manage on his own with only minimal demands on the teacher.

Computers and Machines The various types of teaching devices, discussed in Chapter 6, are the most recent of these supplementary individualized programs. A pupil can readily be assigned to a program that fits his individual situation. He can work on this program while the teacher is engaged in more general group procedures involving other children. The more sophisticated computer programs, of course, will not only carry out a program already selected, but may take the responsibility for selecting the program that is needed.

We should hasten to add that many proponents of computers and machines would not like to see their pet devices described as "supplementary." For these dedicated advocates, the role should be reversed. Computers and machines should perform the regular routine teaching. The human teacher should step in when the mechanical devices can go no further. Many psychologists, on the other hand, hold that the computer inevitably falls short of the complete individualized treatment that is needed in genuine instruction (Jackson, 1966).

Prepared Self-teaching Materials Long before the computer age, many educational technicians had prepared sets of material which permitted the student to follow his own requirements. Boxes or packages contain pretests, directions for selecting study sheets, posttests, and record sheets. Such standard practice tests are frequently used in arithmetic, reading, or foreign languages. To judge from casual observation, even a child in grades three or four seems to get some enjoyment from going to the file, selecting the exercise that comes next on his schedule, taking the test, correcting his work, and recording the score.

Casual Classroom Tutorials When intermediate devices fail to take care of varying students in our class, we have no choice but to turn to a brief or

Individualizing Instruction—A Task for the Computer?

Individualizing instruction, in the educator's sense, means injecting humor into a lesson when a student seems to need it, and quickly becoming serious when he is ready to settle down to work; it means thinking of examples that are uniquely relevant to the student's previous experience and offering them at just the right time; it means feeling concerned over whether or not a student is progressing, and communicating that concern in a way that will be helpful; it means offering appropriate praise, not just because positive reinforcers strengthen response tendencies, but because the student's performance is deserving of human admiration; it means, in short, responding as an individual to an individual.

SOURCE: P. W. Jackson. The teacher and the machine: Observations on the impact of educational technology. Unpublished manuscript, University of Chicago, 1966. Quoted by permission.

prolonged period of individual instruction. On the surface, as we have repeatedly stressed, this would seem the least efficient approach. While working with one child the teacher would have to neglect all the other students. But we must not make too much of this apparent neglect. Certainly we must not imply that the other pupils will be learning nothing unless the teacher is working with them. Much—often most—learning takes place when the student is working on his own. And in some subjects a very few minutes of individual instruction can profitably be followed by an extensive period of individual seat work, reading, or independent practice. It is difficult to say, of course, just how many minutes of independent practice should follow x minutes of instruction. Whenever this ratio is high, however, the teacher could devote a good deal of time to individual instruction with little or no loss of efficiency.

Under many circumstances, moreover, the teacher can do much individual work purely in passing. In the middle of some group activity, the teacher may frequently stop to help some student working at the chalkboard, or another student engaged in some construction work. From this interruption, the group that is momentarily deserted loses little and may even gain from the useful rest period provided.

In defending individualized instruction against the charge of complete inefficiency, we must also remember the effects of salutary eavesdropping or incidental learning. While a teacher is working with one student, others often listen. Such eavesdropping is especially tempting to the student who has a similar problem but who is reluctant to admit it. By listening to the teacher's discussion with Joe, it is possible for Jim, in circumstances devoid of threat, to wrestle silently with the same problem and, in this vicarious manner, to get some extremely valuable help.

Diagnostic and Remedial Programs

Much can be done to honor the individual needs of each child even while he remains in the larger classroom setting. This calls for making use of the more general group procedures as far as they will go and for providing more and more individual attention as circumstances demand. Such a strategy not only keeps the demands on the teacher at a realistic level, but should even provide a wholesome atmosphere in which individual adjustments are fitted in—often casually or spontaneously—to the group process.

For all its virtue, however, we must realize that neither this nor any other strategy will work for all pupils. For such pupils we should resort to individual diagnostic and remedial teaching. This usually calls for the services of a highly trained specialist. Obviously it is a costly procedure. It may also involve a general approach somewhat at odds with the more easygoing approach normal to the general classroom. For the classroom teacher, for instance, it is normal and wholesome to expose the child to reasonable academic demands in the confident expectation that these demands will be met. The remedial specialist may use a more solicitous or permissive approach more suggestive of the sick room than the playground.

The regular classroom teacher should profit from the fact that the clinical specialist is on call. Knowing that he is available for detailed individual help, the classroom teachers can be more confident in their orientation toward group approaches. From these group approaches they would expect normal reactions on the part of most students. They would be prepared, however, to deal with reasonable departures from normal behavior, and for the obdurate cases they would feel free to call in the person with special skill in diagnosing and treating the unusual case.

If he has reasonable faith in the efficacy of ordinary teaching procedures, the teacher is less likely to be taken in by the fads or cults that periodically sweep the educational world. He will be less likely to place all his hopes on some attractive, but untried, gimmick, or to be taken in by some catchword or slogan offered as a panacea for educational ills. The hope, of course, is for reasonable faith in ordinary procedures. Since they cannot hope to suffice in all cases, a smug and blind faith in their complete adequacy would be even more disastrous than an unjustified enchantment with the newest "in" thing of the moment.

Summary

It is the individual pupil who learns, and no two individuals are completely alike. Uniqueness should be honored, talents developed, and handicaps made less serious. These handicaps are seen in children with physical defects, and in the child from disadvantaged districts. Within the school there are many underachievers who fall short of their estimated ability.

Individual differences present both an opportunity and a problem, and the school system has often provided special schools for the gifted and the handicapped. Within comprehensive schools there are supplementary programs, supplying special teachers, or facilities such as counseling, remedial programs, and tutoring. Grouping within the school is common, typically having little effect on achievement, but simplifying matters for the teacher. Programs of acceleration result in more rapid advancement with little detectable harm. Team teaching is designed to permit special teachers to concentrate on special problems. The effects are modest. The nongraded school attempts to permit children to advance at their own rate.

With respect to the provisions in the individual classroom, there has been much concern about matching student and teacher. There are some successes, but many reports of only slight effects. Teachers are also urged to reach a comprehensive understanding of each child and to modify instruction accordingly. This may be unrealistic and perhaps not essential. The data are inconclusive. While teaching the class as a group, the teacher can permit individual reaction, and use general treatments from which each child automatically extracts what he needs. Under ordinary circumstances, something like this typically occurs. With slight effort the process can be made more effective. The use of temporary subgroups is also possible. Within the classroom setting, supplementary individual instruction is available through prepared work materials, teaching machines, and, in some schools, computer-assisted instruction. The teacher himself can safely take time for the casual individual tutorial. When these simple arrangements prove inadequate, the remedial specialist may be consulted.

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PART III

Promoting Character and Personal Well-Being

National Education Association, Photo by Joe Di Dio

12

Character and the Process of Socialization

In the most general terms, socialization refers to the process by which the child comes to fit in with the needs and activities of the larger group. For all the ecstatic welcome he receives, the newborn child is a practical burden. He makes tremendous demands on some members of the group. He is responsible for unpleasant messes and objectionable noise. As he acquires mobility and motor control, moreover, he gives expression to his rage and annoyance in unrestrained and distressing fashion. Altogether a fair amount of energy is used up to make sure that he is protected, guided, and partially restrained.

Viewed in this sense, socialization is considered as a *sociogenic* process (Barry and others, 1959). It is a process carried on in the interests of the group and not primarily for the sake of the individual himself. The interests of the group and those of the individual, of course, cannot be completely separated. Ordinarily the individual can thrive only with the support of a reasonably effective group. The group, in turn, may reap the benefits if the individual is healthy rather than sick, and if he is able to live with himself in reasonably integrated fashion. But for all the inevitable overlapping, the two sets of concerns are not identical. We cannot be sure that what is good for one is good for the other.

The welfare of the individual as a person in his own right (Chapter 16) is considered a *psychogenic* issue rather than sociogenic. In the broader field of *character*, as opposed to socialization, both sociogenic and psychogenic issues are involved. In judging a man's character we obviously consider his dealings with his fellows, but we are also influenced by his inner consistency or integrity. At times, for instance, in making such judgments, we ask not only whether he honors the legitimate claims of other people, and the needs of his larger self, but whether he is also sensitive to the dictates of some abstract principle such as justice, or perhaps to the word of God.

Sociogenic Requirements

To fit in with the needs of the group, the child must primarily learn to behave. He must obey certain rules, preferably rules that he understands and that he himself endorses (Kohlberg, 1964), but in any case he must conform. Much of this pressure centers around impulse control (Hoffman, 1970; Le Vine, 1969), especially with respect to anger and toilet behavior. Later he must learn to restrain impulses that lead to theft or the destruction of valuable property. But there are also intellectual and emotional requirements. Ideally, children should *understand* as well as honor the traditions and values of the group. They should feel proud of those traditions and feel committed to them. The child should also see how he himself fits into those traditions and into the group. Here, again, he should feel satisfaction and pride in this role, and should see it as a means of making positive contributions to the welfare of the group.

Many of these sociogenic requirements could be met if the child merely develops a fierce loyalty to the immediate group, no matter how disdainful or antagonistic he may feel toward other groups. The higher reaches of morality or character, on the other hand, would not permit such a blind or partisan conformity. With more advanced moral development (Hoffman, 1970; Kohlberg, 1964), we find a willingness to challenge rules or customs, and a need to be governed by rules that apply to all individuals, distant or nearby.

Theories of Socialization

Most societies are reasonably successful in socializing their children, and there has been much speculation as to how this development is brought about. Of the theories proposed, some see a gradual unfolding or development of definite structures that lie latent within each individual. Others assume that the child acquires social adequacy in the same way that he acquires skill in hunting or dressing.

The Classical Freudian Stages

According to Freud, the child becomes socialized as he passes through a series of *psychosexual stages*. For the first year of life the child is held to be in the *oral* stage. During that time the pleasure-seeking urges of the id are focused on the mouth and its activities. Dependency feelings are intense. There is pleasure from sucking, drinking, eating, and, later, from biting. From the primitive sources of pleasure, Freud holds that there may develop a later joy in general intake, or in acquisition of things, or of ideas, or of beliefs. From the primitive pleasure of biting there may develop an adult delight in sarcasm or in argumentation.

During the second year of life, the *anal stage* supersedes the oral stage. The pleasure from defecation is important and may become the basis for similar urges later on, as when the adult goes in for spluttering abusiveness, or for a disorderly life. Toilet-training attempts to insist that this pleasure must be controlled and postponed, and this control, in turn, may lead to later obstinacy and stinginess. A tremendous concern about bowel movements may be the basis for adult productivity or creativity.

By the end of the second year the child enters into the *phallic stage*, enjoying genital stimulation and indulging in erotic fantasies. In these latter fantasies, by the way, aggression may play some part. Soon this interest is focused on the opposite-sex parent, and the *Oedipus complex* is in full swing. By this time the developing ego, with its realistic orientation, anticipates the outraged father's violent retaliation and comes to fear castration at his hands. It is for the precise purpose of meeting this and similar menaces that the basic agency for socialization—the *superego*—develops. With the emergence of this new psychic structure, about age five, the phallic stage comes to an end, and the child enters into a long *latent period*, lasting until early adolescence. During this latent period the psychosexual energy, instead of being focused exclusively on the mouth, the anus, or the mother, becomes directed ("displaced") to a variety of people, objects, and even to ideas or concepts. By the time the juices of adolescence lead to new turmoil this enriched pattern of "displacements" permits a more adult form of interest. People are seen as important in their own right, and not merely as a means of providing pleasure to ourselves. The increased urgency of the sex drive, coupled with the broadening vision of the ego, calls for more realistic relations with others. With this more adult orientation, the adolescent enters the final *genital* stage.

By the age of five or so, according to Freud, the child has acquired whatever he is destined to acquire of the basic moral structures. And these structures are exclusively concerned with channeling the primitive psychosexual energy of the id toward realistic and socially acceptable outlets. To many theorists both suggestions seemed implausible—if not repellent. The actual investigations, moreover (Murphy, 1962; Jones, H. E., 1960), although far from conclusive, failed to suggest that the pattern of socialization is so firmly fixed in the preschool years, or that it is exclusively psychosexual in its nature.

Elaborations, Appraisals, and Critiques of Freud

In an analysis of Freud's idea of psychosexual stages, R. W. White holds that this theory "will stand in the history of thought as an astonishing first approximation to a theory of growth in its dynamic aspects." He reminds us, however, that Freud's latest statements were completed almost forty years ago, and that failure to change or modify them will hold us back. More recent Freudians have attempted such a modification by adding interpersonal needs to the simpler instinctual needs stressed by Freud. With the possible exception of Harry Stack Sullivan, however, these neo-Freudians still treat the interpersonal needs as linked to the earlier Freudian needs and stages.

White thinks that no revision of the Freudian drives will enable them to explain the tremendous human concern with the problem of competence. Much of our behavior is motivated by *effectance*—the motive that leads us to produce changes in the environment. (This is related to Thorndike's motive of "being a cause," to Stephens' and Courts' idea of the reward-value in seeing "something happen" and to Sheffield's work on rewards that do not reduce drive.) As the child realizes his own part in producing deliberate effects, we have the motive of *efficacy*. These two motives are organized around the idea of competency. Competency motivation cannot be usefully derived from the drive-theories stressing visceral tensions and tissue deficits. It provides a more convincing explanation of the tremendous increase of skill in doing the world's work. In contrast to the Freudian view, this theory of competence would not regard great objective achievements as merely modified ways of expressing psychosexual drives.

SOURCE: Based on R. W. White, Competence and the psychosexual stages of development, *Nebraska Symposium on Motivation*, 1960, 8, 97–141.

Stages of Ego Integration

The ego psychology of Hartman and Erikson (Chapter 4) avoid the more worrisome extremes of the Freudian approach. To these psychologists, socialization arises from the needs of a realistic ego, and not from the blind instinctual demands of the id. This ego, of course, must take the instinctual pressures into account, but it is not their servile agent. The ego's success—or failure—in meeting these demands, moreover, is determined not only in the preschool years, but in a series of crises that extend into adulthood.

Erikson visualizes eight of these crises, each to be dealt with in a specific stage (see Chapter 2). During the first stage, for instance, the child must wrestle with the problem of *trust* in those around him. If he is successful in meeting this crisis, he is more likely to carry this helpful trust with him in his dealings with people. Secondly, this feeling of trust permits him to interact boldly and confidently with the world, and thus gives him a good chance of mastering the next crisis—the attainment of a feeling of *autonomy*.

And so it goes. The successful resolution of one crisis provides the child with one of the characteristics of the socialized (and integrated) person. This characteristic (e.g., trust), although still to be bolstered and occasionally to be repaired, is basically his from then on. In resolving this crisis, moreover, and in acquiring some new power or characteristic, the child is now in a favorable position to deal with the next crisis. If this new power is acquired soon enough, he will have it at his command by the time the problems of the new crises are thrust upon him, and when there is still a good opportunity for their resolution.

The Crises of Trust and Autonomy In stage one, as we have suggested, the chief crisis is that of trust versus mistrust, and it is the great crisis of infancy. During this period the infant is totally dependent. If he secures the necessary nurture and protection during this period he will develop a basic disposition to trust people. If, lacking this protection, he becomes distrustful, he will find it difficult to correct this feeling later on, and will be handicapped in the next crisis. This next crisis occurs between the ages of one and a half and two, and in this struggle the child acquires either a feeling of *autonomy* or an attitude of *shame*. It is when the child is confident that he will receive protection when needed that he is emboldened to experiment with his own impulses. With success in these experiments he will acquire self-certainty, spontaneity, and a firm sense of autonomy. He will also see some of the limits of that autonomy—not everything will respond to his efforts—but these limits, or failures, are easily endured, provided he can count on affectionate support in case of need. He thus works out some kind of balance between dependence and independence. His sense of autonomy and feelings of pride come from his motor accomplishments—walking, talking, dressing, bowel and bladder control. If these accomplishments are not acknowledged, or if the inevitable failures are met by ridicule or condemnation, the child may come to feel shame instead of autonomy, and such an unsatisfactory resolution of this stage may involve a reduction of any trust acquired in the previous stage. Failure at this time, moreover, will make it difficult for the older child to acquire the self-control and self-esteem that characterize the socialized person.

Stage Three: Initiative—Guilt (approximately three and a half to six years) Viewing himself as a person who can do things, and who can make mistakes without having the world topple over, the child is free to use his developing imagination in the manipulation of things, and in his relations with people. This is the period of play, and it brings much vigorous experience in exploiting the world and in solving problems of one kind or another. He needs experience in expressing a variety of emotions, confident that his basic acceptance is in no way endangered. He should also have free access to a world of physical things that provide many opportunities for success, and the occasional challenging problem. In these interchanges he should not be held to unrealistic standards. Undue anxiety or guilt might threaten any sense of autonomy, or the trust earlier acquired.

Stage Four: Industry—Inferiority (approximately six to twelve years) It is during the elementary school period that the child will wrestle with the crisis which should result in an industrious businesslike attitude to the tasks the world presents. With bad luck, however, the child may avoid the true challenge of those tasks by writing himself off as incompetent. He may come to assume that these tasks with their difficulties and rewards are for other people but not for him. His success in resolving this crisis will be influenced by his school experience, by the tasks he encounters there, by his relations with his classmates, and by his sustained experiences with the new authority figures within the school. He will be fortunate if he can encounter a series of challenging problems presenting reasonable opportunities for success under the direction of a teacher who expects much but understands limitations.

The Crises of Adolescence and Adulthood By the time he approaches adolescence, the child has met four of the eight crises and has worked his way through the corresponding stages with one degree of success or another. It is during adolescence, and the fifth stage, that he must struggle with the identity crisis, hopefully coming to see himself as an integrated person, and achieving some working arrangement with the forces that affect him. Failing this, he faces "ego diffusion" and must enter the next stage with a vague and vacillating picture of himself. If he sees himself as a real person, able to cope with the world, he can hope to deal with the sixth crisis—the problem of intimacy versus isolation. At best, this will be a struggle in which the young adult must face the risks involved in intimacy, friendship, and marriage, or adopt a position of fearful aloofness. Obviously, he will attack this problem with better hope of success if he sees himself as a significant person and not as a vacillating creature whom no one could respect. Having mastered (or failed) this crisis of early adulthood, he now faces the seventh crisis which commits him to accomplishment (generativity), on the one hand, or to stagnation, on the other. Success with this and with earlier crises will make it easier to face the crisis of old age. Now when there is little opportunity to correct the situation, he may be able to look honestly at his faults and failures and still see a meaningful person, or, faced with a self he does not trust and hardly even knows, he may surrender to despair.

Of these later stages, the all-important identity crisis is of most significance to the school, and this is discussed in Chapter 13 along with the general problems of adolescence.

Stages of Social Understanding

In the views of Freud or Erikson we see some inner force—the id or the ego—struggling to express itself, or to realize itself. The theories of Piaget and Kohlberg, on the other hand, assume that the key stages of socialization lie in changes in understanding, or in the development of cognitive moral structures.

Neither Piaget nor Kohlberg, of course, would hold that understanding is enough. They realize that one of the most familiar themes in literature is the anguish of the man who knows the better way, but whose drives and impulses are too much for him. They hold, however, that growth does not come from changes in the drive but from changes in the moral structures which control the drives. Conspicuous moral failures, such as delinquents, are characterized by a failure to develop these cognitive controls. Their moral understanding is still childlike.

Moral Realism In his early years, according to Piaget, the child is in a *heteronomous stage* and his notions are characterized by moral realism. "Good" and "bad" in this stage are determined by what happens in the outside (heteronomous) world. Being involved in a big accident, or in an event that brings the risk of severe punishment is "bad," whatever one's intent. During this stage the child gets a clearer and clearer idea of the rules that must be obeyed if punishment is to be avoided. To him, these rules are quite arbitrary, and fixed in the nature of the real world. In equally arbitrary and automatic fashion, the breaking of these rules lays one open to the risk of punishment.

Moral Relativism By the age of eight or nine the child has begun to alter some of his egocentric attitudes, and with the increase in intellectual power, about the time of adolescence, he is prepared to move beyond this stage. He no longer sees other people merely as *objects* in the real world, and as objects that derive their significance from the effects they have on him. These people are now seen as individuals in their own right, with valid claims on other people—claims that have almost as much warrant as his own. He can thus see moral rules as working arrangements between individuals having equal moral rights. He can judge himself as to whether or not he has respected those rights—whatever the practical outcome of his acts. "Good" or "bad" are now *relative* matters, hinging on intention.

Self-Criticism versus Self-Blame During the period of moral realism, the great control over behavior is self-blame. This is a primitive feeling of distress that comes from the feeling of having done wrong. This may be set off by any misfortune in which the child is involved, even when he intended no harm, or even, indeed, when he was not directly responsible for the accident. It involves regret and a frantic wish that the harm could be undone. There is only a general awareness of the harm done to the other person, however, and there is no feeling of obligation to make reparation.

Stages of Character as Suggested in Classical Theories

Age	*Freud*	*Erikson*	*Piaget*
1	*Oral:* Basis for acquisitiveness, oral aggression	Should learn trust, but could become distrustful	Few clear moral concepts
2	*Anal:* Basis for avarice, tantrums, creativity	Should learn autonomy and control (self-will and negativism); could learn shame	
3	*Phallic:* Erotic pleasure from self and others		
4	*Phallic* (continued) Development and resolution of Oedipus complex	Should learn initiative and imagination; but could learn guilt, fear, dependence	*Heteronomous:* Believes in blind obedience to inflexible rules, but breaks rules. Act is bad if it has bad results (is punished). Punishment is expiative and follows from sin. Unilateral obligation to adults
5			
6	*Latent Period*		
7		Should learn industry, but same pressures working badly could lead to a sense of inferiority. Needs discipline and games with definite rules	
8			
9			*Intermediate:* Believes rules are partly based on mutual agreement; does not follow rules
10			
11			
12			
13	*Genital:* Genuine love for others as persons in their own right. Can become reality-oriented, socialized adult	*Overcoming Identity Diffusion:* Should acquire self-confidence and a clear picture of larger self (including a consistent set of ideals), but may fail to settle the question of "Who am I?" Success calls for much experimenting	*Autonomous:* Rules are internalized. Seen as based on mutual agreement. Rules obeyed. Wrongdoing depends on intention. Justice seen as retributive and permits some mercy. Obligations extend to peers as well as to adults
14			
15			
16			
17			
18			
19			

The self-criticism of the older child is a much more sophisticated matter. The child has a clearer idea of what has happened and the part that he has played, and realizes that had he chosen to do so he could have acted differently. He sees the concerns of the other person as comparable to his own. He realizes his obligation to honor those rights. He sees that by some deliberate act he has disregarded those rights. He shares the other person's distress, and to that he must add the distress that he feels for having fallen short of his own standards.

This highly structured self-criticism serves as an effective *inner* (or autonomous) *control* that functions even when no one is watching. Like Piaget's formal operations, moreover, this can be separated from the specific events and applied to a wide variety of similar events, including hypothetical or imaginary events. The adolescent who is at home with the experience of this more elaborate self-criticism can feel moral indignation over wrongs done to others, quite apart from his own life, or over wrongs to imaginary characters in fiction.

Elaborations of the Piaget Stages The Piaget stages have been elaborated by Kohlberg (1970). Kohlberg's theory of stages is based on a 12-year study of some 75 boys. In the *first stage*, comparable to Piaget's moral realism, good behavior is that which avoids punishment. In the *second stage*, an act is good if it leads people to reward you, or makes them willing to return the favor. Few ten-year-olds have moved beyond this second stage. Stages three and four, however, fit in neatly with the attitudes of many adults. *Stage three* is dominated by, "What would people think?" In *stage four* we ask, "Is this the right thing to do?"—"right" being determined by unalterable laws derived from authority or from the inner nature of things. A thing is bad if it threatens to produce disorder or social confusion. In *stage five* an act is judged to be good if it conforms to an implied social contract. The contract (constitution) can be rewritten by those involved. This stage is typical of the more thoughtful adults in their better moments. In the views of such adults, the governing rules are matters of agreement. Until they are deliberately changed, however, morality demands that they be honored. *Stage six* goes beyond this enlightened legalistic attitude. The exceptional adults within this stage are impressed with the sacredness of each human life. Such adults typically have thought through, and accepted, some principle (e.g., the golden rule, or the categorical imperative) which seems consistent and capable of universal application. In honoring their obligation to further the rights of other people, the adults within this stage may occasionally go counter to the legalistic dictates of stage five, being prepared, of course, to accept the penalties that such nonconformity may bring.

Kohlberg points out that not all students of a given age are in the same stage. Some adults could still be in stage two. He does hold, however, that the sequence of the stages is fixed. To reach stage four we must pass through stages one, two, and three, in that order. He also holds that the sequence itself holds for widely different cultures, and that it is not affected by religious or other teaching. Although the sequence does not change, the rate of passing through it could, of course, be altered.

Socialization as General Learning

Not all psychologists see socialization as the passage through discrete stages. To some psychologists the child learns to behave in the same way that he learns to speak, or learns to be careful around the stove. Some ways of dealing with other people bring reinforcement (smiles, affection, privileges, material rewards) or they bring an awareness (cognition) that "this way of acting leads to that kind of result."

Principles That Have Appealed to People in Kohlberg's Sixth Stage

1. Be guided by the considered claims of prudence, temperance, courage, and justice.
   (Greek—Aristotle)
2. Do justly, love mercy, and walk humbly with thy God.
   (Judaic—Old Testament; Micah 6:8)
3. Do unto others as ye would have others do unto you.
   (Christian—Jesus)
4. Act on a principle that thou canst will to be law universal.
   (Categorical Imperative—Kant)
5. Act so as to bring about the greatest happiness to the greatest number.
   (Utilitarianism—Mill)

In explaining the learning of morality, some stimulus-response psychologists make much use of *acquired drives*. These psychologists see the child as acquiring more elaborate needs such as the need to be near the parent (dependency), the need to escape frustration, or the need to reduce worrisome bewilderment. This latter need, under the heading of *cognitive dissonance* (see Chapter 9), has become the subject of a whole literature (Tedeschi and others, 1971). We often feel a discrepancy between our efforts, or our sacrifice, and our returns. To avoid this unpleasant dissonance we may find ourselves minimizing the sacrifice or exaggerating the returns.

The followers of Skinner take a strong stand against postulating elaborate and invisible drives (Bandura and Walters, 1963). They try to explain moral learning in terms of the same reinforcement schedules that explain other things. They point out, however, that in social or moral learning, reinforcements are likely to be highly inconsistent. Upon blowing a bubble of saliva, for instance, the young infant at one time may be reinforced by smiles and the delighted appreciation of

Conceptions of "Right" Action Prevalent at Different Ages

Stages of Moral Understanding (The Child's Idea of "Right" Action, or Action That Is Morally Justifiable)	*Percentage of Statements Reflecting This Stage*		
	Age 10	*Age 13*	*Age 16*
Preconventional Level			
Stage 1. Obeying authority and avoiding acts that lead to punishment. No conception of reasons for having to obey.	39	10	10
Stage 2. Doing what is necessary to get what you want or what some other people want. Fairness, or reciprocity, seen as an even exchange. Loyalty, gratitude not involved.	30	20	12
Conventional Level			
Stage 3. Pleasing other people. Doing what they approve. Intention is taken into account.	22	30	20
Stage 4. Conforming to law and order. Law and order seen as fixed in the nature of things. Emphasis on duty, respect, and the requirements for adequate group functioning.	8	24	26
Postconventional Level			
Stage 5. Living up to a social contract which has been formally agreed to, and which is subject to change if agreed on. Legalistic approach. Typical of many thoughtful adults.	1	8	28
Stage 6. Conforming to self-chosen ethical principles that are logical, consistent, and universally applicable to each individual because of his rights as an individual. Exceptional even in adults.	1	4	7

SOURCE: Lawrence Kohlberg and Elliot Turiel, Moral development and moral education, in Gerald S. Lesser, ed., *Psychology and Educational Practice*. Glenview, Ill.: Scott, Foresman, 1971, pp. 416–465.

his parents. At other times, however, the adults present may take no notice or may turn away in disgust. Social reinforcement varies not only in this chance or random fashion. It also changes systematically as the child grows older. The seeking of the breast, which at first is followed by tender reception, is later met by a rebuff. The cute performance, smilingly admired in the two-year-old, is scolded in the four-year-old. Some of these changes may come from changes in the standards or expectations that we attach to children of different ages. Other changes come from the fact that social reinforcement is reciprocal. Not only does the parental reinforcement shape the later behavior of the child, but the behavior of the child partially determines the pattern of parental reinforcement. Consciously or unconsciously, parents and other adults change their ways of reacting to the behavior of children. The delighted surprise that greets the infant's first peek-a-boo loses some of its zest and spontaneity after fifteen performances in a row. The patient admonition that follows one upset glass of milk may yield to an irritated scolding after a dozen such episodes. Conversely, we may withhold our reinforcement from some mild forms of behavior, only to supply such reinforcement when the behavior becomes more intense. A mild whimper might be ignored and thus deprived of reinforcement. If the crying becomes more frenzied, however, we may have to pay attention. Mild protests are thus inhibited and screams of outrage reinforced.

The complexities such as those just mentioned make social learning somewhat less predictable, but they do not remove it from the domain of general learning. Keeping these irregularities in mind we could readily see that the learning of social acceptability might well follow the same rules that govern other forms of learning.

The Detailed Mechanisms of Socialization

The major theories concentrate on the overall picture of socialization and the more general processes involved. A number of these theories, however, also stress more detailed mechanisms. Some of these mechanisms, moreover, would be important in their own right apart from the more global theories. Reinforcement, for instance, is one such mechanism. Imitation, identification, and some of the derived needs discussed above are also stressed.

Dependency motivation refers, most basically, to the need to be near the parent or other adult, and, by extension, includes the need to be regarded warmly by this adult. It could come from an ingrained neurological process similar to imprinting, or it could develop as one of the derived needs discussed in the previous section.

Imitation

Long before Freud, Piaget, or Erikson produced their sophisticated theories, imitation had been assumed to be a powerful force in socialization. Imitative behavior seems universal in children, and what could be more natural than to suggest that it is through imitation that the child gradually comes to adopt the verbal style, the manners, and the values of the adults around him?

This well-known process was acknowledged by Freud and included in his system. Freud explained imitation in terms of identification. The young boy, having identified with the father, was led to honor this identity by modeling himself on his father's behavior. Many stimulus-response psychologists, notably Miller and Dollard (1941), also took over the concept of imitation but tried to explain it in terms of learning. Suppose, they suggested, that a boy comes into the presence of his father and thereby reduces a dependency need. At this moment, moreover, the father happens to be sawing wood and producing the distinctive odor of cut lumber. He may also be exhibiting a particular stance, or uttering a characteristic phrase. Each of these circumstances, having been present when the dependency need was reduced, becomes a form of secondary reinforcement. Later, when the boy is alone, he may happen to saw a board. The sight of the cut board (or the smell of sawdust), having been established as secondary reinforcement, will now make him more likely to saw boards in the future. The same thing will happen if he utters a phrase that is characteristic of the father, and hears himself utter it. All in all, when he himself does the things the father did, he encounters the same stimuli that were present when his dependency need was reduced. He comes more and more to do the things the father did and to find satisfaction in the process. Insofar as these processes lead the boy merely to behave as his father does, we have the phenomenon of *imitation*. Insofar as he receives internal reinforcement from merely thinking as (he thinks) his father thinks, or feeling as he thinks his father feels, we have the additional phenomenon of *identification*. Here, in contrast to the psychoanalytic theory, identification comes from imitation and not the other way around.

Imitation, of course, can be encouraged by direct reinforcement as well as by the more subtle kind of internal reinforcement we have stressed (Flanders, 1968). The boy, for instance, may be overtly praised for imitating his father. By deliberate imitation, moreover, he may achieve valuable, need-reducing results. By following his father's activities, the board is cut more neatly, the ball is thrown farther, the opponent is more readily cowed.

Imitation, as seen by Miller and Dollard, could function only after an act has come into play. It is only after a child has performed the appropriate act that he can smell the sawdust or see the cut board. It is only after he has imitated some act that he can be praised for imitating. This does not explain how he comes to imitate the act in the first place. Later on, Mowrer (1960) made much of the claim that the very fact of observing an act could make a child more likely to perform that act, and that the change could take place before the act is ever performed. Under some circumstances, of course, observations may work the other way around. We become less likely to pat the strange dog if we have just seen someone else do so and get bitten for his attentions.

Mowrer's point has been taken up and elaborated by Bandura (1965, 1969). Bandura, in many respects a follower of Skinner (see Bandura and Walters, 1963), has suggested a description of motivation which has a markedly cognitive flavor. He holds that we must distinguish between the *acquisition* of a disposition toward imitation, on the one hand, and the actual *performance* of an imitative act, on the other. The child can acquire the disposition, or tendency, to imitate merely by observing, in what Bandura calls "no-trial" learning. If acquisition is to take place, the child must attend to what is going on, must understand it, and must be convinced of its actuality (Flanders, 1968), but he can do all this without performing the act.

Conditions Favoring Imitation Imitation can affect adults (Berkowitz, 1964a) as well as children, but its effects on children have been more fully studied. Children will imitate live models, actors seen on film or television, or cartoon characters. At one time is was thought that cartoon characters were less effective, but this is open to question (Flanders, 1968). There is no doubt, however, that the people portrayed in films and television can exert a powerful effect.

When aggression is involved, boys are more responsive to imitation than girls. In other areas the sexes show little differences in their tendencies to imitate. Many investigations have tried to see if boys imitate men and girls imitate women. This has proved to be a difficult question to answer. Children of both sexes are more likely to imitate an impressive or high-status model, especially if that model is successful, or approved, or reinforced. Both sexes are also more likely to imitate a model who dispenses rewards or protects younger people. All these factors interact with the sex of the model. In the events that typically occur, it is the male character who exemplifies aggression, and thus influences boys. Women may more often be portrayed as nurturant, whereas in this male-dominated world, men are more often cast in high-status roles.

Identification

There is a close relation between identification and imitation and, as we have seen, there has been an argument about which of these is the primary process and which one is derived from the other. The prevailing view follows the lead of Miller and Dollard and regards identification as a highly generalized outcome of imitation. From imitating the parents so much, the child comes to form a broad tendency to imitate the parent in general.

According to McCandless (1970) the tendency to identify with parents or other adults is also produced by considerations of power. The child sees that these adults have much power to affect him, to punish or reward, and to determine whether or not the child's own goals will be reached. In identifying himself with these powerful figures, the goals become more attainable. Punishments

Children's Imitation of Behavior That Is Rewarded

This study is based on 40 boys and 40 girls from 3 to 5 years of age. Each child was assigned to one of the four groups. Three of the groups watched what seemed to be a television show of two boys playing together.

In the scene presented to one group (aggressor-rewarded) one boy became very aggressive. He interrupted the play of the other, took the toys, and made off, happily, with the other boy's toys and picnic treats.

A second group (aggressor-punished) saw the same kind of aggression, but in this case the victim turned on the aggressor and trounced him. The aggressor was forced to sit cowering in a corner while the other boy resumed his play.

A third group saw two boys in vigorous, nonaggressive play.

A fourth group saw no "television" program.

After the "television" program, each child spent 20 minutes in a room containing the articles that had appeared in the television programs. An experimenter, also in the room, noted his activities. From these notes a record was made up showing the number of aggressive acts similar to those witnessed and the number of acts that were aggressive but different from those seen.

	Program Seen			
	Aggressor Rewarded	*Aggressor Punished*	*Vigorous Play: No Aggressor*	*Control (No Program)*
BOYS				
Number of aggressive acts performed that were similar to those seen	16.2	7.8	10.0	(5.6)
Number of aggressive acts performed that were different from those seen	75.6	45.6	81.7	(62.0)
Total number of aggressive acts	91.8	53.4	91.7	(67.6)
GIRLS				
Number of aggressive acts performed that were similar to those seen	14.5	8.9	4.4	(4.9)
Number of aggressive acts performed that were different from those seen	44.1	44.7	36.7	(51.2)
Total number of aggressive acts	58.6	53.6	41.1	(56.1)

SOURCE: A. Bandura, Dorothea Ross, and Sheila A. Ross, Vicarious and imitative learning, *Journal of Abnormal and Social Psychology*, 1963, 67, 601–607.

are easier to accept if administered by "us" and not by some external "him" or "her." The child comes to identify himself with this powerful dispenser of rewards, privileges, and punishments.

Identification, however produced, is often considered a powerful force in socialization. Identification helps to keep the son from doing what he thinks his father would not do, or leads the daughter to develop the qualities she sees in the mother with whom she identifies. Identification with the parent of the opposite sex, on the other hand, could lead to a rejection of the normal sex role and to serious problems. Along with the identification that a child feels for one parent or the other, some investigations (Bandura and Walters, 1959) have stressed general identification with the home. The child profoundly influenced by this control may not be able to indicate how his mother will react, or what his father will think, but he does have a clear idea of the values and attitudes that are important to the family group.

Dependency Motivation

The concept of dependency is used in several ways and we should distinguish between some of these uses. Dependency, of course, could refer to an objective fact in the sense that the infant's survival is dependent on the care given by some adult. In our discussion, however, dependency is used to describe some need or some behavior on the part of the child himself. Such dependent behavior is shown in several ways (Ferguson, 1970). The following have been observed in one study or another:

Seeking attention, recognition, approval, or even acting up in such a way as to be admonished
Seeking comfort or assurance
Seeking physical contact or proximity
Protesting or crying upon separation from others
Requesting help
Not seeking help, but passively waiting for succor

Some of these ways of behaving involve *emotional dependence*, or *attachment behavior*. In the young child this is shown by clinging to the mother, tugging at her, or making bids for her attention. The older child may continue to feel this emotional dependence but may show it by attempts to secure warm relations with other people, by the need to be close to them, and the need to feel approval and support.

Another form of dependency is shown by frequent requests for help. We see this in the child who wanders through room after room to get his mother to reach him a toy he could easily have obtained for himself. This is the child who must be waited on. This form of dependency is labeled *instrumental dependence*. It may be seen in the passive child who merely waits, whimpering a little, and feeling sorry for himself, but expecting someone else to discover the cause of his pouting and to take remedial action. Instrumental dependence is also seen in the child who actively makes insistent demands for help.

Theoretically, these two kinds of dependency could be unrelated. The older child, especially, could have need for warm and close relations to other people, could enjoy their company, and yet could be self-reliant in taking care of his own problems. In practice, especially with younger children, the two kinds of dependency may tend to go together, since one effective way to have people attend to you, or to stay close to you, is to make them feel obliged to help you.

Naturally the process of socialization calls for the reduction of instrumental dependence. Socialization, however, does not demand the reduction of emotional dependence. A substantial reduction of this emotional dependence might result in a person who is aloof, uncaring, and indifferent to the opinions of others. Emotional dependence, as a matter of fact, probably contributes to socialization. One of the things that leads a child to be socialized is his need to be close to the important people in his life, to bask in their warm regard, and to feel their approval. When the child acts in some ways, he is rewarded by an increase in these things. When he misbehaves or falls short of parental expectations, he fails to secure the cherished approval or expressions of affection.

Ironically enough, emotional dependence motivation can serve to foster the very achievement of instrumental independence. After a certain age, some kinds of independent behavior are likely to be followed by enthusiastic expressions of parental regard, and will thus be reinforced. When this attachment need is adequately met, moreover, as when the mother is present and offering support, the child becomes more adventurous, and less fearful of strangers or of other unfamiliar objects (Bronson, 1968). Under these conditions he might engage in (and be rewarded for) independent activities that he might never attempt without this support.

The Role of Punishment in Socialization

Strictly speaking, punishment or reproof is not a mechanism or tendency within the child. Like its opposite number, reward or reinforcement, it is something that is done *to* the child, and which may engage or set in motion some of the other mechanisms. There are a number of important questions associated with the use of punishment, scoldings, and rebukes, however, and we may as well consider them at this point.

The effects of punishment, in contrast to the effects of reinforcement, are difficult to predict. Typically, as we have seen (Chapter 6), a punished response will be less likely to recur for some time. Whether or not it will be permanently discouraged is a question of great dispute.

One of the great complexities in the use of punishment comes from the fact that the *termination* of a scolding, or a reprimand, or other punishment, acts as powerful reinforcement. And this is something we usually fail to realize as we begin a scolding. This scolding that we have started must come to an end sometime, and this termination will provide powerful negative reinforcement. Whatever the child happens to be doing just prior to this termination will be reinforced, and the child will be more likely to repeat this act in the future. Perhaps he was weeping as the scolding stopped. Weeping will become more strongly entrenched. Perhaps, instead, he was muttering murderous threats against the scolder. Such mutterings will be reinforced. Perhaps the overt scolding continued unabated, but it lost its impact because the child "tuned it out." "Tuning out" will be reinforced.

A deft and alert scolder, of course, could use this negative reinforcement, and neatly cease his reprimand as soon as he observed a desirable response. Few parents are that methodical, however. Most merely quit when they feel like it, thus conferring reinforcement on some chance behavior.

This negative reinforcement not only may strengthen unknown responses, but may even develop strange new drives, likings, or aversions. Such peculiar allegiances are said to occur when the tortured prisoner is suddenly released from torment. This tremendous reduction in the flow of aversive stimuli constitutes pronounced reinforcement. By the mechanism of secondary reinforcement, moreover, we would expect that any person or object, present at that time, would take on some of those reinforcing properties. The tormentor himself, if he were conspicuously present during the rapid cessation of pain, could easily become a source of reinforcement and could evoke in his victim the same attitude that the mother evokes in the infant she succors. Allegiance, then, goes not necessarily to the considerate and faithful provider and protector, but so frequently to the bully or tormentor who merely arranges for periodic remissions of distress while he himself is present.

As we have pointed out, however, the person employing a rebuke thinks not of what will happen when the rebuke is over but merely hopes that the onset of the rebuke will discourage some act. And this, as we have seen, may happen. It is more likely to happen if the reprimand or punishment comes early in the response sequence. It is when the child first begins to reach for the forbidden object that we should say "No." At this point a very mild rebuke is just as effective as one that is more severe. Our reproof will have less effect if we wait until he already has the object within his grasp, and to be effective at all at this point, the reprimand must be severe (Parke, 1970).

In theory, the prompt reprimand should have a number of advantages over one that is delayed. A prompt rebuke may interrupt the act and may prevent the child from ever touching the forbidden object and thus forestall the primitive reinforcement this contact would provide. Even if he does get his hands on the object, a prompt rebuke should become associated with the early reaching movements. In that case, the early reaching movements should thereafter produce the distress associated with the rebuke, and may thus short-circuit the reaching. A rebuke occurring only after contact, on the other hand, would be associated, not with reaching, but with contact. The associated distress occurring at this time might well cause guilt, but obviously it would not prevent the action.

A reprimand will be more effective if it is meaningful or significant (see Chapter 7). It is likely to mean a great deal if given by someone to whom the child feels much attachment or whose opinion he values. It will mean less if coming from a harsh or aloof adult whose regard he has already written off. At times it may help to sharpen the child's insight into just which of his actions led to the scolding (see Chapter 7). If the rationale is made quite vivid, the child's regard for the scolder may not be so important (Parke, 1970).

Development in Specific Aspects of Character

The theories, mechanisms, and procedures discussed so far should apply to all the areas for which socialization is attempted. Some of these areas involve special problems, however, and we consider the more significant of these.

Aggression

Typically, the child changes markedly in the way he expresses his aggression. Much effort, in most societies, is directed to aid him in this process. Aggression could be defined as any behavior which actually does bring pain or distress to another person, or which even harms another object, whatever the intention of the person committing the act. In many cultures, however, and in Western law, the *presumed intention* is also taken into account. Many psychologists go along with these legal and commonsense attitudes and claim that, otherwise, it is difficult to get a meaningful description (Kaufman, 1970). When we take intent into account, we can see that deliberately bumping into a colleague may have much in common with tripping him up as he goes down the aisle, in spite of the difference in the overt acts. Conversely, if we forget about intention, the deliberate tripping would be classified with any incidental act that also caused the person to stumble.

When we do use the presumed intention as a basis for deciding whether or not behavior is aggressive, we might feel the need to distinguish between *intrinsic* and *instrumental* aggression. In intrinsic aggression, the chief goal of the aggressor is to hurt his victim and to cause pain. In instrumental aggression, the main goal is to get the victim's money, or to win a contest. The victim's distress is merely incidental to the attainment of that goal (Levin and Fleischmann, 1968).

Social Values and Dangers Aggression is widespread. In one form or another it appears in many animal species and in most human groups. According to Lorenz (1966), unpleasant as this phenomenon is, it makes many contributions to the survival of the individual and the group. Not only does aggression lead the group to hold off attackers, but aggression within the group establishes dominance, and leads to the emergence of natural leaders so necessary to many groups. Among human beings it plays a part in self-defense and provides the energy for many a social and political cause.

Typically we are less concerned about the possible benefits of aggression than about its serious dangers. Both in raw nature and in the interplay of powerful, sophisticated agencies, uncontrolled aggression could lead to the extinction of the group, the species, or the world. Markedly aggressive species have survived only by evolving powerful devices for keeping aggression within bounds. Wolves and similar species have instinctive surrender signals against which even the most ferocious opponent is powerless to proceed. It is in the cults of the most aggressive human warriors that we find the most stringent rules and restrictions governing the approved methods of overcoming an opponent. The hardened professional in a competitive field will feel consternation and dismay when an erstwhile peaceful amateur—or perhaps a woman—enters the arena. It is much safer to fight with a more vicious opponent governed by well-established rules. It is certainly true that surviving aggressive groups apply much pressure to force aggression into channels that permit the continuation of the group.

Types of Permitted Expression Acceptable channels for the expression of aggression vary tremendously from group to group. In some cultures—certain lower-class homes in the United States, for instance—the chief thing is that expression of aggression should be direct, rather than sneaky or underhanded. The aggressor should come out in the open, making himself available for his opponent's retaliation. It is permissible to inflict bodily injury by hitting or cutting, but not by poison or traps. Violent verbal invective is acceptable, but there is much condemnation of dirty digs cloaked in the style of friendship.

In some cultures it is the style or politeness that is essential. You can challenge a man to mortal combat but must use polite language in the process. You can offer a verbal insult, but in polite form and in a proper tone of voice. More frequently, even in these cultures, however, the rules govern the actions themselves. In middle-class Western culture, private physical violence is frowned upon, but verbal attacks are permitted. In some circles these must be carried out in good taste—no loud angry voices or hostile gestures.

Different rules apply to different people. In some cultures boys may strike boys but not girls. Angry verbal abuse may be directed toward playmates but not toward parents or other authoritative adults. Finally, the age of the aggressor plays a part. The slaps administered by the one-year-old may be accepted with exaggerated discomfiture. At the other extreme, the outbursts of the very old may be shrugged off.

In middle-class culture the child is ordinarily expected to give up physical assault and to express his aggression verbally, taking into account the person to whom it is directed. As he grows older even those verbal exchanges are expected to become more elaborate and restrained. With increasing age, moreover, he is encouraged to channel some of his aggression into things like athletic contests which are structured and governed by rules, and in which there is less place for sheer animal snarling.

Frustration and Other Factors in Aggression According to one theory which was prominent some years ago (Dollard and others, 1939), frustration was the chief, or indeed, the only cause of aggression. In general this theory has seemed to claim too much. Very frequently, it is true, frustration does lead to an increase in the vigor of the responses. If your first nudge does not open the door, the next push is more energetic. And, obviously, an increase in vigor may change an otherwise gentle response—a pat on the head—into something that might readily seem aggressive.

It is also true that a child frustrated in one activity will typically do something else. But it is hard to say just what that something else will be. He may attack someone. But he may also do something quite different. He may try an ingenious method of surmounting the frustration. He may cry or call for his mother. He may resort to some distracting solace such as thumb-sucking or masturbation. Just which of these things he will do depends on which responses he has learned to make before the frustration occurs. If he has already been rewarded for vigorous marching to music, then he may turn to that in the face of severe frustration. If, earlier, he has had some success from fighting or from crying, he may fight or cry. The theory also seems to be too extreme when it claims that frustration is the sole cause of aggression. One of the surest ways to instigate aggression is not to frustrate a person but rather to launch a direct attack on him (Buss, 1961).

But even if it is not the only cause of aggression, there seems no question that frustration is one of the things that may lead to anger and acts of hostility. Unfortunately, moreover, this hostility may be directed not only to the immediate source of the frustration, but also to innocent people or an object nearby.

This whole problem of developing a reasonable tolerance for frustration and for keeping the inevitable frustration within bounds is developed in Chapter 16.

There is the possibility of a strong constitutional factor in aggression. Hormones, such as androgen (the male hormone), play their part, as witness the contrast between the aggressive bull and the placid ox. Other chemicals, such as alcohol, exert their influence. In his presidential address to the American Psychological Association, Dr. Kenneth B. Clark (1971) provoked a great deal of discussion by suggesting that world leaders be given brain chemicals to reduce their aggressive and animalistic tendencies. Insofar as aggression is produced by glandular makeup and by the shaping of experience (see below), we would expect it to be a characteristic of the person, and to some extent this is so. Some people are much given to quarreling or fighting, or to violent expressions of anger. Other people, even in the same situations, would act in milder fashion.

Acquiring a Dislike for a Neutral Object

This study involved 68 boys and 40 girls between the ages of 4½ and 6. Each child played a card game with the experimenter. The child's object was to win enough chips to buy a small toy. There were ten cards in the pack, five of them being blank and five being figure cards, each carrying an ink drawing of a boy (when a boy was playing) or of a girl (when a girl was playing).

The game was manipulated so that each child was bound to lose. Some children, however, started out with almost enough chips (seven) and ultimately lost all but two. This was supposed to induce *high frustration*. Others started out with only two chips and, after a series of losses and wins, also ended up with two—*mild frustration*. In each case the child lost chips when the figure card was present and won when the plain card was present. The high-frustration group lost two chips for each figure card, whereas the mild-frustration group lost one. In a control group, each child started out with two chips and lost equally to plain and to figure cards, ending up with two chips.

After he finished the card game, each child took part in a target-shooting exercise in which he could shoot a popgun at various cards. As *one part* of this exercise, the figure card was used as the target and the child was told he could take as many bonus shots at this target as he wanted. During the actual shooting he was reminded that he could quit any time he wished. The investigator computed the average number of bonus shots taken by boys and the average number taken by girls. As shown in the table, each child is reported as being above average (for his sex) or below average in the number of shots taken.

	Percentage of Children Who Took More Than an Average Number of Shots at the Figure Card	
	Boys	*Girls*
When the figure card had been associated with high-frustration	80.9*	50.0
When the figure card had been associated with low-frustration	28.0*	30.7
When the figure card had not been associated with frustration	45.0	69.3

* These values differ significantly from 50 percent. If nothing were at work, of course, we would expect, in each case, that half of each group would be above the average and half below.

SOURCE: Shirley G. Moore, Displaced aggression in young children, *Journal of Abnormal and Social Psychology*, 1964, 68, 200–204.

But the situation also exerts much control. In some situations almost anyone would become angry.

The Role of Learning and Imitation Socialization is based on the assumption that things like aggression are susceptible to learning. The expression of aggression is undoubtedly affected by the reinforcement encountered, by the insights developed, and by a sense of identification. It is to be expected that it will also be affected by the moral principles acquired by the child.

Under certain conditions, as pointed out earlier, imitation can bring about aggression. Children are quite likely to go in for aggressive behavior if they see a high-status person acting aggressively, and if that aggressive behavior is portrayed approvingly, or if it appears to be rewarded, or to achieve success. And in many shows, and in television, aggression is pictured in this manner. Teachers, by the way, should keep the process of imitation in mind. Their own outbursts may well serve as a model for imitative children.

Punishment for Aggression In many middle-class homes, aggressive behavior is one of the things most frequently punished. As we have seen, the use of punishment in almost any situation is likely to produce many complex and unintended results. In the specific problem of punishing for aggression, moreover, we come face-to-face with the problem of imitation. By angrily rebuking the child for his aggression, we may, it is true, lead him to hold back from that particular aggression for a time. But in expressing our own anger, we also present him with our own aggressive act as a model. The conflicting forces may produce complex and disappointing results.

Punishment may inhibit a specific aggressive act (slapping a younger sibling) for a time. But punishment, especially angry punishment, cannot be expected to eliminate the underlying hostility. Indeed, it might make things worse. Under these circumstances there is considerable danger that this hostility, denied one outlet, may become displaced or redirected to some safer act (taking away the baby's toy).

The Possibility of Catharsis According to the doctrine of catharsis, the free expression of the harmful emotions purges us of those emotions and frees us from their evil power. By acting out our anger we rid ourselves of that anger. The more moderate advocates of this view urge us to express our anger in modified form—vicariously while watching a show or reading a book—or by some more direct hostile act still kept under some restraint. For some therapists, however, the purge is held to be ineffective unless our behavior wholeheartedly reflects the emotions we feel. In some encounter groups the participants are encouraged to go in for enthusiastic screaming and invective when moved to do so.

The evidence does not support the notion that we can thus purify ourselves by sinning (Nighswander and Mayer, 1969; Mallick and McCandless, 1966; Little and Adams, 1965). Children do not become less aggressive when they are encouraged to work out their anger by a direct attack, or by such roundabout devices as hitting a punching bag, or by developing aggressive themes in finger painting, or in literary exercises. If anything, children given these experiences may become more aggressive in the future.

Although there is little to be gained from having the child carry out vigorous aggressive activity, there may still be some advantage in having him give as much expression to his *feelings* of hostility as circumstances will permit. The aroused person can certainly admit his anger to himself. Perhaps he could discuss it with a discreet and understanding confidant. Under appropriate circumstances he might even make a quiet announcement to the person who has provoked him. This issue is treated in Chapter 16, where we turn from the sociogenic requirements of the group and consider the psychogenic requirements of the individual himself.

Reducing Instrumental Dependency

The reduction of instrumental dependence is a simple sociogenic requirement. If the group is to flourish, the infant must become less demanding on the adults around him. In reducing instrumental dependence, there is no insistence that we should also reduce emotional dependence. Perhaps, as a matter of fact, we should try to maintain this at a moderate level. The reduction of instrumental dependence must also be distinguished from the acquisition of independence in the psychogenic sense. From the viewpoint of the individual himself, the concept of independence overlaps that of autonomy. It suggests the need that the individual should be his own man and resist the attempts of others to manage his affairs. Such a need is psychogenic rather than sociogenic. Society does not require that the individual have this urge to manage his own life. When present, it comes from something within the person himself. This need for independence and autonomy is mentioned briefly below and discussed in Chapter 13.

Instrumental dependence is reduced in a variety of ways. It is more likely to be relinquished if the child is not required to move too fast or too abruptly, and if his emotional dependence is respected. The child who feels unquestioning support from the mother is also the child who tentatively ventures forth and gets the reinforcement from his independent behavior. The child who does not feel that he has this home base to return to may continue to be more timid. In his general experience, the child will find that self-sufficient behavior of older siblings or associates also serves as a model to be imitated. Many children seem strongly endowed with urges toward self-assertion or autonomy and these urges, although not always inconsistent with dependent behavior, tend to push him toward more self-sufficient accomplishments.

Autonomy, Responsibility, and Achievement

The steps toward autonomy or independence are not always welcomed by the adults close by. Often the mother would rather untie the knot herself and has difficulty in granting the child's demand that he be allowed to do it. And, as we see in the discussion of adolescence (Chapter 13), the more drastic demands for independence can cause serious trouble within the family and the larger community. All in all, the social group has an ambivalent attitude toward this abandonment of dependence and the acquisition of independence.

For all the inconvenience of self-assertiveness and independence on the part of child or adolescent, many cultures do place a high value on these traits. In Western middle-class culture, for instance, the urge toward achievement is greatly prized (Heckhausen, 1967). This represents the need to get things done, on one's own, and often in the face of difficulties. People powerfully endowed with this need regard the difficult task as an attractive challenge. They set high goals for themselves and get vast satisfaction from their accomplishment.

Intellectual Achievement Responsibility Closely connected with this achievement orientation, and much valued in its own right, is the development of responsibility. The child should clearly realize the results that spring from his own actions and should accept the responsibility for these results. Within the school setting this concern has expressed itself in the study of intellectual achievement responsibility (IAR) (Crandall, Katkovsky, and Crandall, 1965). By the age of eight or so, many children will see many of the things that happen to them as the results of their own acts. Other children of the same age will not be aware of this connection. Upon receiving a bad report, such a child will see it as coming, not from his own activity, but from the teacher's crankiness or caprice, or her tendency to pick on him. Failure in manipulating objects are attributed, not to his own poor performance, but to some malevolence in the "stupid" machine. Typically, such a child sees his own efforts as having little effect on the things that happen to him. These things depend not on what he does but on luck, the system, or the unpredictable attitudes and whims of other people.

Not surprisingly, intellectual achievement responsibility is related to school achievement (Chance, 1965). Any one of several causal patterns (Chapter 8) would produce this connection. The child who believes he can produce effects might naturally be more inclined to try harder. The child who has already achieved in school, moreover, has obviously encountered good results. If he is like most people he will gladly take credit (responsibility) for these pleasant effects. The results encountered by the failing child are much less palatable and he is strongly motivated to find some alibi for them. In this way successful achievement may contribute to IAR. Finally, the same factors (home training, ability to see relations) which promote IAR may also directly promote school achievement.

Intellectual Achievement Responsibility and Academic Achievement

Boys and girls (923 in all, ranging from grade 3 to grade 12) were tested on a scale of intellectual achievement responsibility. The test scores indicated the extent to which a child believed himself responsible (a) for his successes (b), for his failures, and (c) for both successes and failures. School achievement was based on a standard achievement test and on report card averages.

Results for grades 3, 4, and 5

	Academic Achievement of Each Group			
	Report Cards		*Standard Test*	
	Boys	*Girls*	*Boys*	*Girls*
Belief in own responsibility for success:				
High Belief	2.5	2.9	4.6	4.7
Low Belief	2.3	2.7	4.2	4.3
Belief in own responsibility for failure:				
High Belief	2.5	2.9	4.5	4.7
Low Belief	2.3	2.7	4.3	4.2
Belief in own responsibility for both successes and failures: High Belief	2.5	2.9	4.5	4.9
Low Belief	2.3	2.7	4.2	4.1

A similar comparison for grades 6 to 12 showed no dependable relation between IAR belief and achievement.

SOURCE: P. E. McGhee and V. C. Crandall, Beliefs in internal-external control of reinforcements and academic performance, *Child Development*, 1968, 39, 91–102.

In general IAR is somewhat higher in girls than in boys. It is more marked in children from warm, supportive, accepting parents who are given to praise for things accomplished, and who themselves express their feelings of responsibility for the effects of their own acts (Katkovsky, Crandall, and Good, 1967). Understandably enough, IAR is linked with the child's general understanding of causality.

It is this precise grasp of objective causal relations, by the way, which should dominate our goals in this matter. It would be a mistake to assume that the more IAR the better. Many of the misfortunes that befall a child are really not his own doing. Yet children often feel guilty and blame themselves for their own illnesses, for parental discord or divorce, or for serious injury to parents. Even when the child's actions do contribute to these misfortunes, we might not wish to place undue stress on his responsibility. The most important matter in all this is that the child should have a true picture of the actual causal pattern. When he himself has been responsible for the things that have happened he should get an accurate picture of this fact. When he has not been responsible for the events, or when only superhuman care could have prevented them, he should see that fact also.

Altruism

Far from representing the mere reduction of an evil, altruism represents a positive or constructive step in socialization. The altruistic person not only reduces his demands on the group but actually contributes to the welfare of its members.

Under normal circumstances children do show some altruistic behavior. To a certain extent they will share their possessions with those who lack them. This is more likely to happen if the need of the other person is very great (Krebs, 1970), and if that person is attractive or congenial, or if the child identifies with him in some way. Utilitarian attitudes are also at work, and the child may more readily come to the rescue of someone who can return the favor. This is especially true, apparently, of children from the vigorous entrepreneurial homes. Children from the homes of government officials or social service workers may be influenced more by the simple need of an attractive or deserving person. Most children are more responsible when the recipient's need arises from accident rather than from his own neglect.

Children vary markedly in their reaction to the needs of others. Up to the age of nine or ten, at least, older children are more responsive (Bryan and London, 1970). Sex differences are not clear. Girls and women are more responsive to the claims of dependency, and will be more influenced by the claims of one who needs just one more subscription to qualify for the college scholarship. Altruism is frequent in children whose parents welcome emotional expression, and reward the expressions of sympathy for others. Such parents, understandably enough, are those who are also fairly altruistic themselves. The people much given to altruistic behavior are also held to be more sociable and better adjusted in general, although Krebs (1970) maintains that this relationship does not hold up when altruism is measured by objective acts, as opposed to ratings, or self-reports.

The motivating factors are complicated. It is quite a thing for a child to give up his candy or valued toys. Sheer urging or intellectual persuasion, short of authoritative orders, are seldom enough (Bryan and London, 1970). When children do give to others, or help others, they seem to exhibit pride in their acts, and also show worry over the harm that would have come to the recipient if the favor had been denied. Such motivation, when invoked by parents or teachers, should not be too subtle, and should be applied right at the time the decision is being made.

The receipt of favors in response to one's own needs may make for greater altruism, and, in adults, this may lead to a generalized reciprocity. We frequently hear of people who will never turn down a beggar, or an appeal of a social agency, because of help they themselves received when they were down and out.

Imitation plays a part, especially for young children. Exposure to an altruistic model may lead to greater altruism in the near future, and may even produce a lasting disposition toward the helping of others (Krebs, 1970). With children there is some question whether the behavior of the model increases the desire to help, or merely gives specific hints of the kinds of altruistic behavior that might be feasible and free from unacceptable risk (Bryan and London, 1970).

Resistance to Temptation

Ability to resist temptation is a trait that cuts across the other dimensions discussed so far. A child might be tempted to strike a playmate, to run away from school and seek his mother's arms, to give up in the task he has started, or to sneak out of the room when aid to others is being solicited. As studied, however, resistance to temptation usually applies to things like cheating, stealing, or playing with forbidden objects.

As we all know so well, ability in this matter is not an all-or-none process. Like his father or grandfather, a child who passes one test may fail sadly in another (Kay, 1969). There has been much theorizing about the inner controls that override the urge toward some improper act. This internal force may consist of a conscious fear of punishment, or fear of disapproval or of loss of love. Or this force may take the form of immediate but unconscious anxiety. As we hesitantly begin to reach out for the forbidden object, for instance, the unpleasant consequences associated with that movement also come into effect and begin to stir up our insides in unpleasant fashion. As the hand withdraws, these emotions subside. The internal force may also come from an explicit standard or ideal. As we move toward the forbidden object, we see the threat to this ideal view of the self.

Obviously the outcome of temptation will depend on the strength and nature of these inner controls, and on the circumstances that might vivify them or charge them with more energy. The presence of familiar things, associated with parents or the family, might add power to the worry over parental disapproval. Lapses are certainly more frequent in an unfamiliar surrounding in which the person feels cut off from earlier associations (Berkowitz, 1964b). A sense of guilt over a recent misdeed may be more effective than the memory of a more ancient transgression.

Often temptation involves the rival pulls exerted by minor gratification right now versus a greater good to be achieved in the future—the second candy right now versus the freedom from dieting later on. This susceptibility to the claims of deferred gratification, of course, is one of the striking attributes of the middle class.

Types of Background Factors: Résumé

Throughout this chapter we have referred to differences related to social class, home background, or other cultural factors. At this point we bring these scattered references together and show the general influence of these cultural or background forces.

Social Class and Culture Group

The most dramatic forces of socialization are to be found, of course, within the home. But the attitudes and practices of parents are obviously influenced by the setting in which the home occurs. Ideals which flourish in affluent groups may seem less relevant to the very poor. To people like Ezra Doolittle, these ideals may be regarded as luxuries they can ill afford. Few parents, moreover, can avoid being influenced by what the neighbors think, and by the traditions in which they themselves grew up. Along with its effects on parents, this larger social environment has its direct impact on the children themselves. During adolescence the influence of the gang or the neighborhood may outweigh that of the home itself.

In the mere act of describing differences in social groups there is a danger of seeming to exalt or to condemn. In a psychological account such as this, we try to avoid these value judgments and to concentrate on what seems to be so. There is also a danger of suggesting that all the members of one class share a given value or express the same attitude. Obviously there is tremendous variation within classes and much overlapping between classes. This must be kept in mind. As a further warning we should point out that class differences as such may have less significance for parental attitudes than once was thought. Miller and Swanson (1958), for instance, suggest that the amount of risk in the father's occupation is more important than income, education, or class status. Entrepreneurs, whether low-income contractors or wealthy industrialists, have one set of values. Managers and civil servants (bureaucratic groups) have a different set. Entrepreneurial homes emphasize initiative and self-reliance. Bureaucratic homes stress personal adjustment and harmonious group relations.

There is also some suggestion that the traditional differences between social classes is becoming blurred (Bronfenbrenner, 1961). The middle class, with its penchant for listening to experts (see below), is exposed to pendulum-swing changes in advice. The lower class follows a little later as the oscillations become somewhat smoothed out. Often the middle class, in moving from strictness to permissiveness, may meet the lower class and suddenly become aware of the need for stricter supervision.

Cooperation, Competition, and Cultural Background

Groups of children of different ages and different culture-groups (Anglo-American, Mexican American, and Mexican) took part in a special game. In this game cooperative play would regularly result in rewards for both players. Competitive play brought reward for neither child.

	Percentage of Each Group Showing Each Kind of Behavior				
	Ages 4–5		*Ages 7–9*		
Type of Behavior Observed	*Anglo-American*	*Mexican American*	*Anglo-American*	*Mexican American*	*Mexican*
Cooperative Behavior Throughout	74%	73%	10%	29%	63%
Competitive Behavior Throughout	3	3	14	6	7
One Child Submitting to the Other	3	3	0	2	1
Efforts to Avoid Conflict	0	7	2	5	5
No Conflict	6	14	1	2	8
Partial Conflict	12	7	29	25	9
Number of Children in Each Group	(54)	(62)	(46)	(53)	(51)

SOURCE: S. Kagan, and M. C. Madsen, Cooperation and competition of Mexican, Mexican-American, and Anglo-American children of two ages under four instructional sets, *Developmental Psychology*, 1971, 5, 32–39.

Finally, we must remember that there is a prominent cognitive component in the more complex moral values and attitudes. Some moral positions call for ability to deal in abstractions. Consequently class differences in values may merely reflect the very general differences in intellectual performance. Certainly when we examine groups of comparable intelligence, we find less difference in social-class values (Zigler, 1970).

But for all these cautions and reservations, there may still be some lingering remnants of earlier differences that the teacher should be prepared to encounter. Pronounced guilt, for instance, seems to be more prevalent in the middle class.

The greater incidence of suicide in middle-class cultures has been linked to this capacity for guilt (Zigler, 1970).

Many middle-class citizens have a strong commitment to abstractions—to mankind in general, to the claims of justice. In the lower-class groups, to a greater extent, the commitments that matter are one's obligations to recognizable individuals or to groups with whom one can emphathize. It is wrong to steal from a buddy or from a fellow member of an oppressed class. It is worse if the theft brings serious harm to someone helpless or already in need. Stealing from the rich oppressor is a different matter. It is quite true, of course, that these distinctions are found in all classes. Robin Hood has widespread appeal. And many people from the middle class have one attitude toward stealing from the government or a rich, faceless corporation, and a different attitude toward stealing from an identifiable person. In spite of these widely prevalent compromises, however, we will find a larger percentage of middle-class people who are convinced that it is wrong to steal from anyone, irrespective of the amount stolen or the victim's affluence.

At one time it was held that the lower-class parents were much more permissive and indulgent. If this ever were generally true, it seems to be no longer so today (Zigler, 1970). If anything, we now find greater permissiveness in the middle class. In the reports of the children themselves, parents from the lower socioeconomic groups are seen as less affectionate and as more controlling (Goldin, 1969).

Parents and the Home

For young children, of course, the larger social pressures can work only through the medium of parents or immediate caretakers. And for many years it is in connection with the home and its pressures that the most intense socializing episodes occur.

Ways in Which Parents Differ From the vast amount of work on parent-child relations, a number of *factors* or *dimensions* have emerged. To get a compact picture of parental behavior we should ask, first of all, where that parent stands on the dimension of *acceptance* versus *rejection*. Acceptance implies love, freely displayed; the urge to be close to the child physically and psychologically; the wish to share ideas with him; and the tendency to treat him as a person of some consequence. Rejection implies aloofness, indifference, or actual hostility. As our second question, we should ask where the parent stands on the dimension of *permissiveness*, or the *granting of psychological autonomy*, versus *restrictiveness* and *insistence on psychological control*. At one end of this dimension we find the parent who lets his child speak freely of impulses and feelings, and who also permits him to make a number of mistakes. At the other extreme we find the parent who seeks to control each act and feeling. He may do this out of solicitude or out of hostile rejection.

Theoretically these two dimensions are quite independent of each other. A parent's standing in one of these gives us no clue to his standing in the other. One loving, accepting parent could grant his child a great deal of freedom. Another could hem his child in closely with a great many restrictions. The aloof, rejecting parent could similarly let the child do pretty much as he pleases, or, at the other extreme, he could insist on meticulous adherence to some rigid rules (Goldin, 1969).

In practice, as opposed to theory, these two dimensions occasionally lose some of their alleged independence. At some levels of intensity, or when dealing with some areas, for instance, the distinctions between restrictiveness and hostility become blurred. Restrictive orders, when accompanied by shouting or incessant scolding, are likely to be interpreted as anger. When the restrictive parent must deal with aggression in the child, moreover, he frequently does become angry. But these are the exceptions. To get a fairly complete picture of his attitude toward his child we must know about his standing on each of the dimensions.

In a number of analyses of parental behavior (see Goldin, 1969), an additional dimension has been suggested. This is less clear-cut, however, and is variously interpreted as having to do with the frequency and intensity of punishment, and with firmness or laxness in the enforcement of rules. Much of the information appearing in this dimension, moreover, could be deduced from a parent's standing on the other two.

Changing Fashions in Parent-Child Relations To the consternation of many observers, parent-child relations are not what they used to be. Over the past fifty years, in Western countries particularly, there has been a fairly consistent change along both of the dimensions we have mentioned (Bronfenbrenner, 1961). Parents may not love their children any more than they used to, but modern parents, again in the Western countries, are more open in their expression of affection. Their acceptance of the child is also more likely to have a comradely component. Fathers, moreover, no longer merely issue orders from the front office but have entered the arena and have joined in the hurly-burly of actual child rearing. In general, parents have also moved toward the permissive end of the second dimension. They are especially more likely to permit the child's free discussion of his impulses and his feelings.

These changes have been first noted in the behavior of middle-class parents. These are the parents, of course, who read what the experts have to say and who take the experts seriously. Once firmly established in the middle-class culture, however, these new fashions become advertised in Dick and Jane readers and in the endless television accounts of family life. As they permeate these and other aspects of the culture, they also become somewhat apparent in the lower-class home.

Those who read the experts, of course, are frequently forced to trim their sails (Ryerson, 1961; Wolfenstein, 1951). Before World War I, parents were warned

The Masculinity of Fatherless Boys

Junior high school boys were given a test to determine the degree of masculinity in their concepts of themselves. Each boy also indicated the extent to which his mother had tried to encourage him to act in masculine fashion. Twenty of these boys were without fathers. For 10 boys, the absence occurred before the age of five (Early); for the other 10, the absence occurred after five (Late). Twenty were from two-parent homes.

Mother's Encouragement of Masculinity	*Degree of Masculinity in Self-Concept Scores*		
	Father Absent		*Father Present*
	Early	*Late*	
High	54.6	52.2	54.2
Low	34.8	54.0	55.5
High and Low Combined	44.7*	53.1	54.8*

* Difference between these figures is significant. The score of 34.8 differs significantly from the general cluster of results.

Masculinity of self-concept seemed unrelated to age, intelligence, social class, presence of siblings, mother's employment, reason for father's absence, or presence or absence of stepfather.

SOURCE: H. B. Biller and R. M. Bahm, Father absence, perceived maternal behavior, and masculinity of self concept among junior high school boys, *Developmental Psychology*, 1971, 4, 178–181.

against indulging their children, and against any hint of frivolity in parent-child interactions. Erotic interests were to be nipped in the bud. In less than thirty years this advice has been completely reversed.

The Child's View of Fathers and Mothers In line with the traditional stereotype, most children see mothers as more loving and nurturant and fathers as more powerful and more given to control (Goldin, 1969). Again in line with folklore, it is the son who is most likely to report the father as controlling and restrictive. In his attitude to his daughter, the father is often described as nurturant and indulgent (Maccoby, 1966).

It is not only with respect to the control exercised by the father that boys and girls give different reports. In describing the home in general, without specifying either parent, boys discuss issues of control and punishment. Girls talk about affection.

Background Factors and Their Outcomes

Children exposed to the different background factors seem to develop in somewhat different ways. Some of these linkages have already been mentioned. At this point we bring the different factors together and look at the general pattern.

The Vindication of Folklore It is fortunate when elaborate and painstaking research verifies homely wisdom and legalizes the things we would like to believe. In many respects this has happened. When children are treated in kindly, considerate, and intelligent fashion they themselves often turn out to be reasonably well disposed to other people and to act freely and constructively in their relations with others. This reassuring picture has emerged partly from the study of children who are self-reliant in schoolwork and who are confident, natural, and assertive in their relations with people (Baumrind and Black, 1967; see also Ferguson, 1970). When these children and their parents are observed together, we can see that the parents think highly of their children, and confidently grant them a degree of autonomy, but they also expect their children to live up to some significant demands. The discipline used to enforce these demands follows a consistent and humane pattern.

Amending and Refining Folklore Our rosy tribute to the effects of goodwill and intelligence is not, of course, the whole story. There are a number of important details to be added, and these may be either reassuring or sobering. Some of these more detailed results are summarized in Table 12.1, derived from Becker's (1964) work, and stressing the two basic dimensions of parental behavior earlier discussed.

When we find children who are in serious trouble, whether this be trouble with the law or trouble with themselves, we are likely to find reports of rejecting parents. Rejection on the part of parents leads to the *risk* (not the certainty) of trouble of one kind or another. If that rejection is accompanied by excessive restriction or control, the trouble, if it comes, will take the form of neuroticism or some internal distress. If rejection is accompanied by negligence and lack of standards, any difficulty that does arise is likely to take the form of delinquency or behavior disorders.

So much for the probable effects of rejection or limited affection. When love and acceptance are abundant, restrictiveness may promote consideration for others and a relatively docile attitude. Permissiveness within a loving home often leads to vigor and to the less guarded expression of impulses, whether those impulses are friendly or aggressive.

TABLE 12.1. Characteristics of Children in Relation to Parental Attitudes and Practices

	Second Dimension	
	Restrictive versus Permissive	
	(much psychological control)	*(psychological autonomy)*
First Dimension Accepting: warm; high value placed on child	Among the many different kinds of children in this category there are an unusual number who would be described as "good." Frequent adjectives: polite, obedient, conforming, unaggressive; highly dependent, not friendly in an outgoing way, not creative	Many, but not all, of the children in this category are rated as active, friendly, and socially outgoing. Many of them handle their aggressions very well (not hidden or turned against self, or retained as a grudge); creative, independent, ready to assume adult role
versus		
Rejecting: aloof, hostile, punitive	Neurotic problems, when they occur, are often found in this category. Frequent descriptions: withdrawn, shy, quarrelsome with peers, aggressive against self, reluctant to assume adult role	Disproportionate number of delinquents. Frequent description: refuses to comply, aggressive, hostile

Difficulties in Interpreting the General Trends We must be extremely careful not to jump to conclusions as to what causes what (Chapter 8). Unless we do take care, we might easily decide that placing a high value on a child may actually contribute to his self-reliance, or that parental rejection may be one cause of delinquency. But we cannot be sure of these causal patterns. In studies based on ready-made differences, there is always the possibility of reversed causality. Parents may affect children, but children may also determine the behavior and attitude of the parents. A child who is already self-reliant may elicit more admiration and regard from his mother, and may find her more ready to grant him a measure of freedom. An incipient delinquent, brought home for some early offense, may well receive a cool or irritated welcome from his parents. The possibility of a common cause must also be considered. There must be something in a mother that makes it possible for her to seek out qualities to admire in her child. Perhaps this same disposition expresses itself in other acts as well, and these other ways of acting may promote self-reliance. There is some reason that causes a father to hate his child—bitterness over his own failure or anger against the "system"—and this same cause—the paternal failure, or a feeling of social persecution—may directly affect the behavior of the son, even if the father were led to feel more love for the son. Finally, we must remember that many of these data come from reports made by the children themselves, and the basic characteristics of the children in trouble may color the nature of the report. The child, neurotic for other reasons, may see restrictions when none were actually imposed. The delinquent, obsessed with the fact that he never gets his due, may see an ordinary amount of affection as bordering on rejection.

Summary

Socialization is a sociogenic process conducted primarily in the interests of the larger group. The child must learn to meet some of his own needs and to obey the rules of the group. He should also understand and respect the traditions. Freudian psychology holds that the child rapidly passes through stages of psychosexual development, acquiring the all-important superego by the age of four or five. Erikson postulates eight stages in the development of the ego. In any one stage the child must meet and deal with a crisis before moving on to the next stage. Prior to adulthood, the child should attain trust, autonomy, initiative, and freedom from guilt, industry (as opposed to inferiority), and a sense of identity. Cognitive theorists such as Piaget and Kohlberg think that socialization comes largely from social understanding. The child should come to understand the generality of rules, should see that other people are important in their own right, should see that rules have a rational basis and should obtain a picture of himself as a person of goodwill with moral obligations. In attaining these concepts, he acquires the idea that morality goes beyond avoiding punishment, blind obedience, being pleasant, or even the legalistic honoring of contracts. Still other theorists consider that socialization, like the mastery of language, is simply a matter of learning. They stress the powerful role of acquired drives, of imitation, and of the complications involved in punishment.

Imitation, stressed in several theories, may be linked with Freudian identification. It may also arise, to some extent, from the reinforcements which often follow imitation (success, praise from adults). It may resemble the exposure learning discussed in Chapter 2. High-status models in fiction or in real life are likely to be imitated, especially when their acts are seen to be rewarded. Consistent imitation of a single model (a parent, for instance) may lead to identification in which the child merges his identity with that of the model. This proves very influential in socializing the child. Socialization calls for the reduction of instrumental dependency in which the child relies on others to supply his physical wants. Emotional dependency, on the other hand, can be continued with no harm to society and often with some gain. Punishment, frequently used to induce socialization, has complex side effects, the termination of punishment leading to unpredictable reinforcement. When used, it should be applied at the onset of the forbidden act.

Aggression typically calls for socialization. In different cultures different forms of aggression are permitted, but some regulation is the rule. Frustration often triggers off aggression. So does a direct attack. Drugs play a part. Hormones and general glandular makeup are important.

Instrumental dependence is best reduced by a gradual program in which the child can strike out on his own, knowing he can fall back on parental support. The demands for autonomy and independence are psychogenic rather than sociogenic, but many societies provide moderate support. The urge to achieve and the sense of responsibility for achievement (or failure) are greatly prized in many Western cultures.

Altruism increases with age and is elicited by deserving congenial people in obvious need. It is instigated by emotional rather than intellectual factors. Imitation can be a force. The temptation to steal or to play with forbidden objects is partly controlled by anxiety conditioned to the forbidden act, and by the threat to the self-concept.

Class differences in socialization are probably less marked than in the past. The differences may reflect life-style (risky versus safe) more than class. Class differences are less conspicuous when intelligence is held constant. But some differences persist. In the middle class we find more commitment to abstract principles and more pronounced feelings of guilt.

In their socializing practices, parents differ on the dimensions of acceptance versus rejection, and permissiveness versus restriction. Theoretically these are independent of each other; in practice they overlap at times. Practices change over the years. Middle-class parents are now more open in expressing affection and show more comradeship. In general we find superior socialization when children are treated in kindly, intelligent fashion. Harshness or rejection brings a threat of delinquency (permissive or indifferent homes) or neuroticism (restrictive homes). With abundant love in the home we find either considerate children (restrictive homes) or children given to free expression of impulse, kindly or aggressive (permissive homes). These trends could come from direct influence, a common cause, or from the fact that different kinds of children elicit different treatment from parents.

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13

Adolescence: Transition to Socialized Maturity

In discussing adolescence, different people emphasize somewhat different periods of life. All agree, however, that it is a period of marked transition. At one time this transition was considered to be turbulent, dramatic—a period of storm and stress. The physical changes involved were thought to produce a tremendous strain on the adolescent's health, and issues of great consequence hinged on his reaction to the many challenges he encountered.

More recent accounts of adolescence present a less disturbing picture. True enough, there is still some emphasis on the crucial issues to be faced and the serious decisions to be made. Many of the transitions, however, are considered to progress fairly smoothly with little feeling of trauma on the part of the adolescent himself. It is now well known, for instance, that this period is not especially marked by ailments and physical defects. Only 50 percent of adolescents will report any illness during the year, and only 5 percent will see a doctor (Department of HEW, 1959). Were it not for accidents, this period would represent the healthiest years in the human life cycle. Severe psychic turmoil, moreover, is not the universal experience. For many adolescents the problems encountered at this period are no more shattering than those already met, or those still to come. If his relations with his parents have been reasonably happy so far, they will probably continue to be satisfactory throughout adolescence.

But some confusion and uncertainty are almost inescapable in this transition from child to adult. Under the blandest of transitions there is some doubt about obligations and privileges. From day to day, and from task to task, the adolescent must wonder if society regards him as infant or full citizen, as a dependent or someone who carries his own weight, or perhaps a little more than his own weight.

The Adolescent Period

Adolescence is roughly synonymous with the teens. Most writers agree that it begins with some stage of sexual maturity. It is difficult, however, to decide on its termination. Adolescence presumably ends when the individual attains some aspects of adult status—when he is regarded as an adult in the eyes of the law, in the eyes of his family and associates and, especially, perhaps, in his own eyes. Obviously the youth may be an adult in one of these aspects but not in another. According to McCandless (1970) the crucial test is that of *self-governance*. To be considered an adult, a person must have the ability and the willingness to make his own major decisions and he must also have the power or the means to implement those decisions. At least there must be a reasonable chance that if he chooses he can initiate practical steps to carry out the decision. If he must clear most of his decisions with his parents before acting, or even if he feels he must, then he has not attained complete adult status, no matter what his age.

The Beginnings of Adolescence Puberty, the beginning of adolescence, is attained with the production of a live egg or live sperm. The first egg or ovum, with its attendant menstruation, occurs on the average about the age of 13. But there is a tremendous range. Among a large number of girls in grade four there may be one who has begun to menstruate. In a large class in grade 10, there may be one girl who has still to reach this stage of maturity. It is more difficult to tell when a boy begins to produce live sperm. Some numbers are produced, however, prior to the first nocturnal emission, and this occurs, on the average, between age 14 and 15. Here again, there is an enormous range.

Puberty, of course, does not appear overnight. Two years or so beforehand there are signs to indicate that the glands are stirring and that puberty is on its way. So dependable are these indicators that some investigators have used these early signs themselves as the beginning of adolescence. It would seem safer, however, to classify these as aspects of *pubescence*, and reserve the term "puberty" for the stage we have indicated.

For girls, one of the earliest pubescent signs is a slight enlargement of the breasts; for boys an increase in the size of the testicles. This is followed by the appearance of pubic hair, and for boys, the first of the two voice changes. The most definite sign is the growth spurt. This precedes menstruation by about one year. The growth spurt probably also precedes puberty in boys by about the same span. Physiologically speaking, this growth spurt is a dramatic race between two forces. The first force produces growth in the cartilaginous areas between portions of the bones. The second, overtaking force leads to fusion, and this prevents future growth. For girls, the latter forces win out shortly after puberty. Boys will continue to get taller for some years.

Sexual Maturity and Bodily Change Although puberty does mean the appearance of the basic reproductive cells, it does not necessarily mean the attainment of complete sexual maturity. Even after puberty the reproductive organs may continue to develop, and there has been some claim that the ability to bear or to beget a child may have to wait on this subsequent development. Ability to bear a child may hinge on the adequate development of the uterus and associated structures. To sire a child, the youth must not only produce some sperm but must produce them in astronomical numbers. With this maturity, or even preceding it, there develops intricate machinery making possible the sensations, the responses, the reflexes, and the secretions needed for sexual activity.

Along with sexual maturity come the secondary sex characteristics making for the sex appropriate physique. One sex develops breasts, hips, and an even distribution of fat under a finely textured skin. The other develops shoulders, a beard, and a rougher skin that does little to disguise the bony protuberances beneath.

Implications of Physical Change To the student of development, the physiological attainment of sexual maturity is the most dramatic aspect of adolescence. The person undergoing the experience, however, often takes this development in his or her stride and does not think of himself or herself as stepping out of one life and into another. Perhaps the drastic puberty rites of some societies are designed to force the youth to take notice of a transition he might otherwise minimize. True enough, adolescents are aware of the outward physical changes taking place, and feel interest, pride, elation—or perhaps disappointment. But as far as sheer physiological functioning is concerned the matter is not frightening or dramatic.

But changes in physique or in secondary sex characteristics are another matter. A definite *body image* arises, and this could be a source of worry. Many adolescents are unhappy about their general physical appearance. Along with worries about acne, boys worry about being short, pudgy, or weak looking. There may also be some concern about size of the penis. Girls worry about being too tall, too short, too fat or too thin, too hippy, too full in the breasts, or too scantily endowed. The adolescent's own reactions to his physical makeup, together with the actual or imagined reaction of others, may have a definite

Personality Differences and Early and Late Physical Maturation

College men and women (234 in all) completed inventories and questionnaires to indicate degree of anxiety, personal needs, and degree of identification with parents and others. Each student also classified himself as an early maturer, average, or late maturer.

Only four differences between early and average maturers were significant at the 5 percent level, average males in this group showing more need for endurance, and "early" females showing more tendency toward exhibition. "Average" females showed more resemblance to their mother's religious views.

Late maturers differed significantly from either early or average maturers in a number of respects. Compared with either early or average maturers, "late" boys were more anxious, had a greater tendency to seek succorance and to express abasement, but had lower drives toward dominance or endurance. They were generally less likely to perceive themselves as similar to relatives or friends. "Late" girls were also more anxious than early or average maturers and more likely to see themselves as sharing their fathers' political views.

SOURCE: D. Weatherley, Self perceived rate of physical maturation and personality in late adolescence, *Child Development*, 1964, **35**, 1197–1210.

effect on the self-concept. In general, late-maturing boys are handicapped in their view of themselves, and are less likely to be taken seriously by their fellows (Weatherley, 1964; Mussen and Jones, 1957). There is little advantage, however, in earlier-than-average puberty. Girls are less affected by early or late puberty, but an extreme delay is associated with a moderately reduced self-concept.

We must not imply, of course, that the body image, with its impact on the self-concept, arises entirely from the secondary sex characteristics. For boys, especially, sheer size, strength, and bodily skill play a great part in the adolescent's view of himself. But for many boys, and for most girls, the greatest worry would come from failure to approximate the sex-appropriate physique.

Adolescent Development: Continuations and Beginnings

In attempting to describe the adolescent period we have had much to say about sexual development and some of the general physical development associated with these sexual changes. The most dramatic sexual changes represent something completely new. Many other physical changes are merely the continuations of processes at work since conception (Chapter 2). Following the adolescent spurt and puberty, the boy has acquired four-fifths of his height, and the girl has over 90 percent of her adult stature. Both sexes will increase their bulk—boys by one-third or more, girls somewhat less. For boys, sheer strength will increase markedly and this increase may continue into early adulthood. The typical boy will also acquire greater athletic prowess during adolescence, often showing an increase of some 25 percent. In our culture the typical girl shows little athletic improvement after puberty.

Sexual Interests and Dating

With the attainment of sexual capacity, there is an explosion of sexual activity in the form of masturbation and sexual intercourse, especially in the case of boys. The actual data change with each journalistic report (Rainwater, 1966), but we can assume that there is much activity in the early years of adolescence. Sexual interests become more pronounced and more highly organized, but it would be a mistake to assume that the adolescent is exclusively preoccupied with sex. Feelings of hostility, striving, and self-assertion are often more conspicuous than sexual fantasy.

There has been some concern over the fact that dating and going steady now begin at earlier ages. This early pairing off, however, is quite different from the more intense experiences of later adolescence. For the younger children, it is a matter of friendship rather than courtship, and the motivation comes from the expectation of the gang and not from strong individual urges. Early dating does not indicate a likelihood of early marriage. For the older adolescent, dating involves increasingly mature relations. Girls especially come to lean less on their girl friends when meeting a strange boy. Dating comes to hinge less on events (dances, parties) and comes to be based more and more on a genuine concern for the other person.

Cognitive Development

In Chapter 3 we traced cognitive development from infancy through adolescence. Here we need only reemphasize some of the important changes that take place during the teens. By the end of this period the adolescent has approached, and may have reached, his full intellectual stature. He needs experience in using his intellectual equipment and must taste its powers and learn its limitations, but he will acquire little more of the kind of power that is tapped by the typical intelligence test itself. According to Piaget, he has acquired the structure of the formal operations, or as much of that structure as he is destined to have.

Through the mastery of the formal operations, as pointed out in Chapter 3, the adolescent can think logically about abstractions that cannot be linked to any concrete experience (5th dimension, the $\sqrt{-1}$). He can even deal logically with assumptions known to be false (the assumed mean in statistics). Being no longer bound down to concrete particulars, he can reach new levels of

The Conspicuous Place of Hostility (and Menace) in Adolescent Fantasy

A number of adolescents (average age, fifteen) had taken the Symonds Adolescent Fantasy Test. Thirteen years later, 28 of these took part in a follow-up, and again completed the Fantasy Test.

In this test, the subject sees an ambiguous sketch, as in the Thematic Apperception Test, and describes what he thinks might be going on. The different themes appearing in each account were then noted.

The table shows the number of people (as adolescents and as adults) who included each theme in at least one story. The most frequent themes are listed and are sorted into three general categories.

	Anger, Death, Violence		*Altruism, Fond Relations, Romance*		*Achievement, Effort, Success*	
	Adolescent	*Adult*	*Adolescent*	*Adult*	*Adolescent*	*Adult*
Hostility	26	15				
Punishment	25	23				
Being Attacked	21	10				
Eroticism			21	24		
Repentance	20	17				
Death (Not Criminal)	20	10				
Crime against Property	19	12				
Striving, Effort					19	19
Success					19	16
Planning					18	15
Jealousy			16	7		
Criminal Death	15	6				
Illness, Accident	15	9				
Separation			13	12		
Anger	12	13				
Disobedience, Rebellion	11	8				

SOURCE: P. M. Symonds, *From Adolescent to Adult* (New York: Columbia University Press, 1961).

abstraction. With these unhampered, free-floating ideas he acquires tremendous cognitive flexibility. He can move freely in the allusive world of metaphor, or in the upside-down world of satire. He can see himself as he knows himself to be, and also get a partial glimpse of the self that others see. In looking at political systems or social orders, he is not limited by actual examples but, if he chooses, can consider an almost infinite set of alternatives. This, of course, is not an unmixed blessing. In describing some of these airy political or moral alternatives, for instance, he may disturb some of his elders who are forced by circumstances to concentrate on the practical. In contemplating so many alternatives, moreover, he himself may become confused, cynical, or indecisive. The more introspective student may come around to a more sophisticated form of the egocentrism of early childhood. Seeing these encoding concepts developing from his own mind, he may come to feel that the concepts and the things they encode are nothing more than his own intellectual creations or dreams.

The adolescent who makes much of his new mastery of abstractions can prove to be a trial to adults who have had to come down out of the clouds. If he is articulate and assertive he may also strike his elders as arrogant and unduly critical in a destructive sense. But these new powers, irritating as they sometimes are, permit the mastery of the more intricate academic subjects, and may be necessary if the adolescent is to attain an enlightened view of his duty to his fellow men.

Attaining a Sense of Identity

In Erikson's (1968) view of personal development (Chapter 12), the identity crisis of adolescence has great significance. It is during the period of adolescence that the developing individual must take the most crucial steps in dealing with the question "Who am I?" Hopefully, he can come up with a coherent or integrated picture of himself, embracing his sexual identity, his goals, his fears, his need for independence and for dependence, and the ethical demands he imposes on himself. Failing this, he must live with a *diffused* self which lacks an independent and coherent structure, and which changes its nature from one situation to another.

The Identity Crisis and Its Hazards For the adolescent, an integrated view of the self does not come easy. Looking at the physical changes in himself, and confronting the various reactions of others, he first sees a self that varies tremendously and changes unpredictably. His deepened voice suggests the man, his beardless face, the boy. For girls, the child-woman uncertainty is even greater. For both boys and girls, the reactions of other people bring an even more confusing array of roles. At times he is vigorously urged to remember his near-adult status. At times he is rebuffed in his near-adult aspirations. Too old to be waited on, too young to make his own decisions, he must wonder, "Who am I?" or if there is a single, coherent "I."

It will be easier for him to search out a unity within these selves if each of the different selves is reasonably attractive and pleasant to look at. Even the diffused picture should not be devoid of self-esteem. And when any unity does seem to emerge, this unified self should not produce too much distress. A reasonable amount of self-esteem is necessary to encourage him in his search for a coherent identity. Lacking a sense of worth, he may wonder if he has any hope of influencing others, or if he has the right to do so. And, in Erikson's view, a sense of social commitment is one aspect of a successfully integrated ego.

In first contending with the worrisome picture of a diffuse and changeable self, the adolescent is anxious and somewhat desperate. He may try to find an artificial unity by identifying with local or classical heroes, or by slavish conformity to the caprices of his group, or by blind, unthinking allegiance to some cause.

Ego Identity and Satisfaction with College

Using a five-point rating scale, college students indicated their satisfaction with several aspects of their college experience (the general program, the faculty, the administration, and their fellow students). On the basis of an interview, each student was then classified as to his identity status, especially with reference to the extent of occupational and ideological commitments. Four classifications were used.

	Average Satisfaction with Different Aspects of College (High Scores Mean Greater Satisfaction)			
	General Program	*Faculty*	*Administration*	*Peers*
Identity Groups				
Identity Successfully Achieved	4.2	3.4	3.1	2.7
Moratorium (Still in Crisis) Seeking Commitment by Examining Alternatives	3.0	2.8	3.0	2.9
Foreclosure (Commitment without Crisis)	4.4	3.6	3.7	3.3
Diffusion (Not Committed and not Seeking Commitment)	3.3	2.9	3.2	3.0

The general pattern of results was significant.

SOURCE: A. S. Waterman and Caroline K. Waterman, The relationship between ego identity status and satisfaction with college, *Journal of Educational Research*, 1970, 64, 165–168.

This blind allegiance demanded by only one of the different selves is not the same as the more rational, realistic commitment of the more inclusive and integrated self attained at the end of this fifth stage.

Important Aspects of Identity Achievement In his search for identity, the adolescent must deal with many specific issues. Prominent among these are thoughts about occupation and about political and social ideology. To attain an acceptable and integrated view of the self, the adolescent must see himself in some occupation, or in a reasonable social role. To most people, occupation is a significant aspect of the self. In describing himself, for instance, the typical adult will tell you fairly soon about his work or occupation. Before he has resolved the identity crisis, the adolescent must also have some view of himself as a "believer." He must be aware of his views and values with respect to social, political, and moral issues, and he must see these views as fitting into the claims of the larger self.

Attempts at Empirical Validation Erikson's views on the identity crisis of adolescence have been derived, in part, from his observations of disturbed adolescents in a clinical setting. Studies based on normal adolescents, however, have confirmed many, if not all, of his suggestions. During adolescence there is a rapid development of a sense of identity and ego integration. This is shown by more realistic appraisal of the self, by increased objectivity in seeing the self in relation to others, and by a marked increase in ability to describe one's concept of the self (Evans and Potter, 1970). Girls approach this identity more rapidly than boys (Jones and Strowig, 1968). Not surprisingly, ego integration is more likely when the sex role is easy to accept. Feminine girls and manly boys have more success in attaining this identity. The achievement of identity is also more typical of students who do well in school (Cross and Allen, 1970).

For most adolescents there is an increase in self-esteem during this period. Girls get their feeling of worth from personal relations. For boys, the self-esteem is related to success in school, sports, work, hobbies, or in the ability to get dates. Along with this general increase in esteem, there is a growing concern, not to say agitation, about the merits of the self. But all this concern or worry does not always express itself in the form of a single dramatic crisis in which everything is settled once and for all (Offer, 1969). Some students, of course, do report experiences that clearly suggest the Erikson concept of crisis. Others report change and modification but seem to have experienced none of the turmoil or drama the term implies (Marcia, 1966).

Autonomy, Independence, and Self-Governance

For some adolescents the attainment of autonomy and independence represents a harsh struggle, and for most, this progress toward autonomy involves a good deal of confusion or uncertainty with all the anxiety that this may entail. For the typical adolescent, however, this is a matter of separate incidents. The boy wants the car but cannot have it. The girl wants to attend a late party, but parents demur. These incidents provoke immediate annoyance and bewilderment. But few adolescents piece these together and visualize a general pattern of struggle for independence. It is the parents who take this attitude and agonize over this worry. For the adolescent, each frustration is a problem in its own right. For the parents, the incident is merely a symptom of a more worrisome general trend.

For the average adolescent, emotional autonomy, like practical independence, is acquired gradually and with little sense of crisis. He is more likely to get over an undue emotional dependence on parents if he has grown up with an abundance of warm emotional support and has been permitted some management of his own affairs. The emotional dependence is more likely to continue if the home has placed great stress on obedience.

Social Competence

During adolescence there develops a greater constancy of friendship. A friendship will not last as long as the comparable relations between adults, but there is not the hectic instability of childhood friendships. Boys and girls, of course, differ in this matter. Friendships between boys are more enduring but are less intimate. Boys are also less generally demanding in their friendships. Girls expect much more and are more inclined to go in for elaborate discussions with their friends about just how things stand between them.

Boys and girls differ not only in their relations with a specific friend, but also in the way they react to the general group. For boys, the group as a unit may have great appeal. The group exists as an entity somewhat apart from the individuals who make it up. For girls, however, the group is more likely to be a collection of individuals. It is a pool from which a friend may be drawn, or in which a rival may be encountered. These trends remind one of the principle of "male bonding" set forth by Lionel Tiger. In this theory, group solidarity was forced on males by hunting and dangerous exploits. It had less urgent importance for women.

For both sexes, the adolescent group exacts tremendous conformity in dress, jargon, recreational and esthetic interests. For major decisions (college, job), however, most adolescents assume that parents will play a more decisive role.

The Special Issues of School and Career

The adolescent is confronted by many problems and issues. The accustomed relations between parent and child are inexplicably changed and begin to include bewildering and seemingly inconsistent demands for adult behavior. Friendships take on a new character and involve more continuing responsibility. Sex and romance at times may dominate one's life. The larger world opens up with its threats and its opportunities. From time to time each of these issues is on the individual's mind, and, if asked, he may mention each as a problem in his life. Many of the issues, however, are seen not so much as continuing systematic problems but as individual episodes which, when he thinks about it, could be sorted into one category or another.

Compared to some of these other issues the problems of the school seem less vital. School problems and career problems are experienced, however, as a central continuing issue. The "school" is a structured force in his life, apparently having more unity than such entities as home life, friends, or the general problems of romance (Offer, 1969; Adams, 1966; Douvan and Adelson, 1966). In the eyes of the adolescent himself, school is an important, steady, continuing issue.

The General Nature of School Issues

As children grow older the school becomes an increasing source of concern and worry (Neale and Proshek, 1967), and this is especially marked in adolescence. A few of these worries are focused on individual teachers, courses, or specific events. Teachers are held to be dictatorial and to show little concern for the individual student. Rules seem to be completely arbitrary and designed chiefly to vex the students.

But the specific gripes are not the chief worry. Most of the concern comes from the school as a broad, generalized system. The school, being such a conspicuous feature in the life of the adolescent, may be blamed for distress arising from other sources. The important peer relations are largely managed in the setting of the school. However kindly and thoughtful the teachers, the school is bound, day in and day out, to symbolize the tradition and authority of the larger society. When irked by the frustration to his growing need for independence, the adolescent thinks of the school. His new powers of criticism are also most naturally directed to this conspicuous institution with its explicit formulations serving as an inviting target.

There has been some general worry that people on the threshold of maturity should have so much of their lives dominated by an institution in which they inevitably retain something of their infant status. Well before the end of high school, most girls and many boys are adults, physiologically, sexually, and intellectually. In many ways they are able to assume the role of adults and under natural conditions would ordinarily do so. In those natural conditions, of course, there would still be something like teaching. In the management of her child, for instance, or in the launching of his canoe, the young adult would receive much unsolicited advice and direction from elders, and this would suggest some continuation of a childlike status. In school, however, the emphasis is reversed. Here we do not have incidental advice coupled with the performance of an intrinsic task. Here there are no intrinsic tasks. The whole point of being in school is to receive advice or directions, to master traditional wisdom, and thus to be continually kept in a somewhat childlike role. Even when, as adults, we voluntarily take lessons in flying, judo, or art appreciation, we assume some aspects of the childlike role. When we are pressured into that role by law or by social expectation, the reminders of infancy are even more pronounced. To do away with some of this excessive influence, Illich (1971) has suggested that regular school attendance should not be compulsory, and that the student should be given much more autonomy in selecting the means by which he will acquire the skill needed for various occupations, or by which he will meet any demands imposed by society.

School Dropouts

In using the term "dropout" we call attention to the widespread expectation that adolescents really should be in school for a certain definite time. Failure to stay in school for this expected time is a matter for sadness, or worry, or perhaps for condemnation. However rational or irrational this expectation (see above), it does exist. At a more practical level, failure to graduate may make things difficult in getting a job. Educators also regard large-scale dropouts as a sign that the schools are not giving the adolescents the things they want, or think they need. All in all, there is considerable worry over the general pattern of dropouts in the United States (Scales, 1969; Tannenbaum, 1968; Cervantes, 1965; Ristow, 1965). During the past decade some 7.5 million students left high school before graduation, and understandably enough, much of the joblessness and delinquency is found in this section of the population. Failure to graduate, of course, could easily mean the lack of a job. We must be careful, however, in assuming that dropping out is the cause of delinquency. Perhaps the forces leading to stopping school in the first place are the same forces that lead to delinquency.

As suggested above, there are many reasons for dropping out (Elliot and others, 1966). Health or some family crisis may leave the student no choice. Often the dropout presents a picture of low aptitude and, for him, dropping out is merely giving up a project in which he has had little success. Finally, there are those who seem capable of the work but quit anyhow. The last two categories would seem to call for different treatment. If the less capable student is to stay in school he probably needs a modified program suited to his limited academic abilities. For the capable student, the issue seems to be one of motivation or persuasion.

Characteristics of Dropouts Dropouts tend to come from the lower socioeconomic groups, and from parents who themselves have had little education. Many of the parents provide little emotional support for their children.

Traditionally, high school has been a problem for children coming from homes with little academic background. The values of both the school and the other students seem strange. Most of the lower-class students, it is true, come to accept the middle-class values of the school, but they are less successful in

The Occupations Attained by Dropouts and Graduates

In a follow-up study, conducted approximately 10 years after high school attendance, a comparison was made of the occupational status of dropouts and high school graduates. The population in both groups was predominantly white.

	Percentage of Former Students in the Different Occupational Levels			
	Men		*Women*	
	Dropouts	*Graduates*	*Dropouts*	*Graduates*
Number of People	(699)	(816)	(481)	(491)
Occupational Level:				
Professional or Semiprofessional	2	16	4	21
Clerical or Skilled	17	24	21	23
Semiskilled	26	21	30	26
Slightly Skilled	30	16	24	17
Day Laborer	11	3	5	1
In Service	—	—	6	5
Farmer	7	6	7	6
Unemployed	5	2	3	1
Student	2	12	—	—

SOURCE: S. R. Hathaway, P. C. Reynolds, and E. D. Monachesi, Follow-up of the later careers and lives of 1,000 boys who dropped out of high school, *Journal of Consulting and Clinical Psychology*, 1969, 33, 370–380.

S. R. Hathaway, P. C. Reynolds, and E. D. Monachesi, Follow-up of 812 girls 10 years after high school dropout, *Journal of Consulting and Clinical Psychology*, 1969, 33, 383–390.

attaining the things stressed by those values. As a group they do not do so well in academic work, in extracurricular activities, or in acceptance by other students. It is not surprising that many of them wonder if they really belong. The lower-class students who do remain tend to be conformist. The more creative lower-class student, with his associated rebelliousness, is more likely to quit (Janssen, 1968).

Again, taking dropouts as a group, we find a pattern of academic unhappiness prior to the actual leave-taking. To a greater extent than his remaining classmates, the future dropout is late and absent a good deal and is a disciplinary case when he is present. He has a history of failure and is weak in such basic subjects as reading and arithmetic (Schreiber, 1968; Cervantes, 1965). As indicated above, he is relatively unpopular and participates very little in general school activities.

The list of traits suggests a student who does not take kindly to school, and this dislike or lack of interest is the thing most frequently mentioned by the dropouts themselves. Along with these reasons, or perhaps hiding behind them, there may be more specific dislikes of individual teachers or subjects, and resentment over the indifference of other students (Ristow, 1965).

School Factors It is easier to dislike some schools than others, and the dropout rate varies from school to school. The schools with low dropout rates have elaborate counseling programs for the parents of potential dropouts. They also have extensive counseling programs for the students themselves. Some of them work out separate grading systems so that the less able students will not be rated in relation to the more capable. Students on the verge of dropping out are assigned to smaller classes staffed by teachers chosen for their interest in the personal development of the student (Scales, 1969). In all this, by the way, we must not be too hasty in deciding on cause and effect. Schools able to provide these special facilities may well have had other advantages, and may also have drawn their students from a more fortunate clientele.

Jobs and Careers

The problem of choosing a career, of course, is important in the practical sense. If these decisions can be made fairly early, the adolescent will find it easier to plan his program of studies and arrange for the necessary training. But practical urgency is not the only issue. To achieve a complete sense of identity, the adolescent must see himself as committed to a definite career or social role. Indecision on this issue would imply a diffused rather than an integrated ego. The claims of identity integration are met if the student makes *some* decision, even though it is not final, or even though it is not feasible. Adult mental health, of course, is endangered if an unsatisfactory choice is made and adhered to.

The importance of vocational decisions and vocational guidance has long been recognized by educators. Until very recently, however, too much of the actual research has dealt with the vocational development of the white, middle-class male (Holland and Whitney, 1969). We still do not know enough about the occupational opportunities and problems of career-oriented girls, or of disadvantaged youth of either sex.

Approaches to Vocational Preparation There are several views of the basic problem in vocational preparation. At one extreme we find a stress on general attitude, such as a commitment to the middle-class work ethic. At the other we find an emphasis on the detailed matching of the students' traits and abilities, on the one hand, with the requirements of various jobs, on the other (Tennyson, 1968).

It is the latter *trait-factor* approach which has dominated vocational thinking in the past. Researchers have gone to endless trouble to find out the interests and abilities that are demanded in various jobs. Elaborate instruments are available to obtain a profile of interests and abilities in the student. From this it was hoped a satisfactory match would emerge. It has become apparent, however, that things are not quite that simple. At the very least, we may need a more sophisticated description of the traits or abilities (Holland, 1966). Perhaps the whole approach is too rigid and mechanical.

In the sociological approach, it is assumed that it is unwise to make specific plans in this precarious world. We may steer a student toward a job which will soon be obsolete, or which may soon call for abilities not yet envisaged. Conversely, with changing social conditions new and unforeseen opportunities may appear, and for these the early training may be irrelevant. Vocational success, in this view, will depend on a more general ability to analyze vocational issues as they arise, and to use effective techniques of problem solving.

The proponents of the *self-concept* approach to vocational preparation point out that job satisfaction is unlikely unless the nature of the job fits in with the individual's view of himself as a person (Osipow, 1968). Ideally, of course, a realistic self-concept should include an understanding of one's own abilities and limitations. But the actual self-concept may stress some of these abilities and yearnings and minimize others. The self-concept, obviously, changes during adolescence, and it is certainly during this period that it should take on a definite structure. What the student sees in any occupation is determined partly by his self-concept at that time. Any serious and realistic decisions are unlikely until the self-concept has gone through its adolescent transformations and has become stabilized (Super, 1957). When that has happened it is important to choose, and later to enter, an occupation consonant with that self-concept.

The important congruence between self-concept and job concept is not, of course, a one-way street. As the adolescent imagines himself in one job or another, his self-concept may change. This is especially likely to happen if the student strongly identifies with the heroes of some of the occupations he contemplates. The heroes may be from real life, history, or literature (Havighurst and others, 1962). Work that was once abhorrent may now become attractive, not because the work seems different, but because the student can now see in himself something to which that work might appeal.

To some writers on vocational development, the crucial match is not between work and overt self-concept, but between the job and the basic drive structure or the *personality dynamics* of the individual. This drive structure, often largely unconscious, stems from parent-child relations. According to one psychologist (Roe, 1956), students from warm, supporting homes are attracted to occupations calling for close contact with people. Students from cold or rejecting parents will lean toward jobs dealing with ideas, things, animals, or plants.

The emphasis on the underlying personality dynamics serves not so much as a practical guide but as a reminder of the many forces that play a part in voca-

Self-Esteem and the Crystallization of Vocational Commitment

College students (114 men and 102 women) completed inventories to indicate (a) the number of occupations that came high in their preference, (b) their feeling of certainty about their vocational choice, and (c) their feeling of self-esteem.

The students showing most self-esteem (Top Third) and those showing least (Bottom Third) were compared on their vocational attitudes.

		Groups Showing Different Degrees of Self-esteem		
		Top Third	*Bottom Third*	*Difference Significant?*
Average Number of Vocations Marked as Preferred:				
	Men	2.7	2.9	No
	Women	2.5	2.4	No
Feeling of Certainty (1 means most certain):				
	Men	1.9	2.3	Yes
	Women	1.6	2.3	Yes

SOURCE: H. Resnick, M. L. Fauble, and S. H. Osipow, Vocational crystallization and self esteem in college students, *Journal of Counseling Psychology*, 1970, 17, 465–467.

tional satisfaction. Happiness or success in one's work is affected by perceived sex role, parental hopes, occupational prestige, cognitive style, level of aspiration, drive to achieve, need to help others, need for security, craving for luxury, the chances of being recognized, or the need for adequate self-expression (McCandless, 1970; Rosenberg, 1957).

The different approaches would differ with respect to timing. The self-concept approach, especially, would warn us against pressuring a student into premature vocational decisions. All approaches, moreover, would imply that the adolescent should give much thought to the world's work and his place in the pattern. Even when this does not lead to an early decision, it will provide examples for exercises in the art of making decisions about occupations (sociological approach). Such contemplation may be vital, moreover, if the adolescent is to see additional aspects of himself and to see these more realistically (self-concept). Such intensive contemplation, coupled with well-selected work experience, may give him some early hint of the half-hidden but powerful attractions and aversions that may come into play when he does begin a definite vocation.

Socialization, Morals, and Citizenship

As new capabilities and drives develop during adolescence the tasks of socialization become increasingly urgent. In some societies sexual activities must be encouraged and shaped to meet the population requirements of the group. In other societies those activities must be curtailed. Persisting aggressive urges must be prevented from damaging or destroying the larger group. Even the more subtle values of the group should be honored. Concerns for group welfare must be developed, in the hope that the maturing individual will immerse himself in the problems of the group and take some constructive action toward their solution.

In such an intricate process a number of failures are inevitable, and these failures take different forms. When sanctions lose their effectiveness, a sexual revolution could hold unknown threats. Failure to control aggression leads to delinquency and violence. Disenchantment with the values of the larger society may result in a hedonistic, irresponsible drug culture. Even when young people conscientiously take on the responsibilities for social well-being they may want to go too far—too fast—too violently.

The Regulation of Sexual Behavior

The increased sexual drive and the increase in sexual activity naturally lead to some effort at control on the part of society. In some societies, it is true, there is very little restriction and what there is may be directed to a single facet of sexual behavior, such as respecting incest barriers. Apart from that, in these societies, a fair amount of adolescent sexual activity is considered normal and even necessary for adequate development. At the opposite end of the continuum we find societies with rigid restrictions involving segregation of the sexes, strict chaperonage of girls, and severe threats of punishment and disgrace attached to any sexual activity whatever. Between these extremes almost any degree of permissiveness or restriction may be found.

Western cultures, such as the United States, tend to be quite restrictive. Premarital sexual intercourse has been considered wrong. To many people it is just sinful, period. Even to those with less arbitrary values, such premarital activity has meant risks of venereal disease and unwanted pregnancy. Many adolescents, however, have recently assumed, quite mistakenly, that these practical dangers can easily be dismissed. So long as that conviction persists, however unwarranted, any convincing arguments for restraint must rest on other grounds.

STATE INSTITUTE OF EDUCATION

Changes in the Sanctions Stressed To justify the widespread adult distress over the idea of unrestrained adolescent sex, a number of people, including some adolescents, have advanced ethical arguments. Sexual expression, for instance, is held to be an intense and intimate form of communication (Wagner, 1970). This valued experience could be cheapened if it becomes too casual or is treated lightly. We should reserve some levels of communication for those who count in a special way. When sex is treated merely as a source of playful pleasure, moreover, there is a danger that the partner shall be regarded merely as a means of securing that pleasure, and not as an individual with his own precious needs. And to some thoughtful people, this using of people, or treating them as means rather than ends, is an absolute ethical wrong.

The so-called sexual revolution has meant reduced emphasis on fear of disease and pregnancy, and in the minds of the revolutionists there is no room for arbitrary condemnation. In these new attitudes there is also a revulsion against

Factors Linked to Family Planning

Each of the married couples in this study had three or more children, and in each case it appeared that an additional child would mean some hardship. During the previous two years, some couples (Users) had used contraceptives systematically and successfully. Others (Nonusers) avoided the use of contraceptives, or failed to use them effectively, despite the necessary knowledge. The two sets of couples were matched for age, education, income, and religion. All were interviewed and rated on certain feelings and attitudes. The results were not included unless both spouses received the same classification. The number of "usable" families for each trait ranged from 5 to 10.

	Percentage of:	
Psychological Traits	*Users*	*Nonusers*
Higher than average feeling of efficacy	100%	33%
Definite need for achievement	57	12
More than average tendency to plan ahead	60	0
Expect to be accepted (not rejected) by others	100	25
Positive (rather than negative) view of opposite sex	57	0
Belief that child should ultimately take care of parents	33	87

SOURCE: A. B. Keller, J. H. Sims, W. E. Henry, and T. J. Crawford, Psychological sources of resistance to family planning, *Merrill Palmer Quarterly*, 1970, **16**, 286–302.

the hypocrisy that separates public attitude from private behavior. A number of investigators doubt that this change in value patterns has led to much more sexual activity during the past thirty or forty years (see Bell, 1966), but it is possible that there is more premarital intercourse on the part of girls. Naturally enough, in this new thought, female sexual satisfaction is as important as that of the male. The new values call for love, but not marriage, as a prerequisite for sexual intimacy. Clearly this view can lead to near-tragic distress in the relations between many adolescents and their parents. The conflict between mothers and daughters is especially severe (Bell, 1966).

Apart from the ethical issues involved in sex training, the psychologist is concerned with the conditions which will permit a rich and happy life during adolescence and which will contribute to a healthy, zestful life later on (Berger, 1970). There is some question as to whether the older restrictive treatment has accomplished this. And it is still too early to decide what will happen from merely easing the restraints. No pattern of adolescent sexual activity would be considered satisfactory unless it provided safeguards against later guilt over the possible greedy sexual exploitation of others, and against the trauma of disease or unwanted pregnancy.

Sex Education Considering the powerful urges that lie behind sexual activity, we would be unwise to depend too much on sheer knowledge. Such knowledge, however, might reduce worries and troublesome misconceptions that do affect behavior and which often persist into adult life (Payne, 1970; Wagner, 1970; Staton, 1968; Rainwater, 1966). For years there has been much thought of reducing these problems by sex education in the schools. Adolescents themselves frequently express the need for such education (Payne, 1970). By the time they express such a wish, however, they have less interest in the anatomy or physiology of sex—so frequently stressed in school courses—than in the practical and ethical questions involved in sexual behavior.

In a proposal made some time ago, Ausubel (1954) has suggested that education dealing with anatomy and physiology should take place before puberty. Children of this age are frequently curious about such matters and their unmet curiosity can cause much needless worry. They don't know, they want to know, and they should know. During early adolescence, Ausubel would emphasize psychosexual development, sex differences in maturation, and the emotional and moral aspects of sex. The moral aspects would stress personal honesty, self-respect, and respect for the feelings and rights of others. The more detailed advice regarding sex practices should be given by specially trained counselors.

There is some evidence that sex education can lead to increased factual knowledge (Kirkendall and Miles, 1968). The effect on the molding of attitudes and behavior, however, is still undetermined. As things stand now, realistic sex education must be prepared for many problems. The school's views may not coincide with the attitudes of some parents. Many teachers may find it difficult to avoid embarrassment in treating the functional aspects of sex. Adolescents themselves may be disturbed to hear "old" people talking about sex. When it comes to sex, "dirty" and "old" go together. There may be something revolting or obscene in seeing people over thirty laying their decaying hands on a topic that belongs to youth and only to youth.

Protest and Dissent

Student protest and dissent, so prominent in college, is also observed in many, perhaps most, high schools. At both levels the protest deals with local rules and conditions considered oppressive. In college it is also directed to larger social injustice, prejudice, or war (Trump and Hunt, 1969).

The Characteristics of Student Activists

College students were sampled to secure 6 groups of about 12 students each. These groups covered three levels of political ideology (left, middle, right), and each level included a group of politically active students and another group of nonactive students. All students took a battery of tests and inventories.

	Scores on Various Characteristics			
		Ideology		
Characteristic	*Activist (A) or Nonactivist (N)*	*Left*	*Middle*	*Right*
Ratio of *actual* amount of political activity to desired amount	A N	.67 .63	.66 .69	.64 .68
Verbal Ability	A	62.8	66.5	62.4(a)
	N	57.9	60.4	48.0(b)
Emotional Stability	A	18.6	23.4	22.3
	N	19.6	17.9	24.5
Concern for recognition and social acceptance	A	9.3(c)	13.8(d)	11.7(e)
	N	9.6	11.7	12.8

Difference between lines (a) and (b) are significant. The figure (c) is significantly less than either (d) or (e).

SOURCE: L. C. Kerpelman, Student political activism and ideology: Comparative characteristics of activists and nonactivists, *Journal of Counseling Psychology*, 1969, 16, 8–13.

In many countries, of course, the college has typically been associated with revolution and social reform (Lipset, 1970; Lipset and Altbach, 1969). Recently in the United States it was the racial issue which not only incited much of college protest but suggested the favorite devices (sit-ins, for instance) for bringing home the issue. Underlying such explicit clear-cut issues as prejudice and war, there are undoubtedly general frustrations brought on by the long-continued infantile status (see above) of millions of youth. This has been particularly vexing for the new lower-class student who does not regard college as a playful interlude prefacing an assured job later on.

Although many students—as many as 40 percent of some colleges (Skolnik, 1969; Sampson, 1967)—accept the larger values of the protesters, only a few of these students would themselves be considered activists (Lipset, 1970). As might be expected, from the kinds of motivation at work, there may be two distinct types of activists (Keniston, 1967). On the one hand, there is the social idealist, committed to a cause and willing to take the steps, however disruptive, that seem necessary to the cause. This student is well informed and does well in school. Often he comes from a home that has similar political views. On the other hand, we find a group of bitter, somewhat alienated students, eager to express their dissatisfaction in any convenient fashion. These students are likely to be at odds with their parents, often contemptuous of the materialistic values of their parents (Langton, 1970).

So long as the issue is really a school matter, sincere discussion should do much, especially if it is begun before the stage of overt action (Gorton, 1970). At the very least such talk will postpone less rational action. At times, however, the professed issue is not the real issue, and the real objective is to challenge the establishment and to reveal the ugly power on which it is alleged to rely. Under these circumstances the protesters may go to some trouble to make talk unpalatable and to bring about the use of naked force.

Protest, Youth Culture, and Autonomy

Protest is not exclusively a matter for youth. The views of many student activists do not differ markedly from those of their closest elders (Offer, 1969; Bealer and Willets, 1961; Elkin and Westley, 1955), and many students discuss these matters freely with their parents.

But in many respects there is also a definite youth culture. The previous dependence on parents is transferred to friends and age-mates, and it helps if this group can be distinctive and identifiable (Spindler, 1970). This heady identification can become more attractive and more powerful as the culture becomes more distinctive in dress, manners, talk, and entertainment. Some such distinctive culture as we have suggested has always been typical of adolescence. More recently, however, these spontaneous developments have become more extreme. Publicized and glamorized, and promoted by ease of travel, the simpler gropings for solidarity have become more self-conscious, and have been escalated into a codified way of life.

In the acquisition of autonomy, of course, the youth, having freed himself from unthinking adherence to parental standards, must later free himself from slavish conformity to the adolescent group. There is a danger that this emancipation may be delayed if the group values become unduly dramatized. If it persists it may exact too much in the way of loyalty and overt commitment. On the other hand, there is the hope that the richer and more satisfying these adolescent allegiances have been, the easier it will be, when later demands insist, to give them up without shame, and without the bitter reactionary attitude that often accompanies transitions or conversions.

Delinquency

The delinquent adolescent has failed to socialize his aggressive urges in a way that most of his elders would approve. Many delinquents, it is true, may be strongly influenced by their own peer culture and may conform to its demands. But they do not conform to the larger social order or to the established laws. Their failure to conform, moreover, takes a form that is difficult to ignore.

The Designation of Delinquency One hears a great deal these days about the appalling amount of delinquency in our young people. It is difficult to know whether or not the actual picture is as black as the more vocal reporters would have us believe. Our estimates are based largely on the cases brought before the authorities. But these official figures may represent as few as 2 percent of all actual delinquencies (Gibbons, 1970; Gold, 1970). If better police methods raised this figure to 3 percent, the result would be an apparent increase of 50 percent in the official rate, even though the actual delinquency rate changed not at all. After making allowance for these problems, however, investigators claim that juvenile delinquency really is on the increase and is becoming more vicious (Gibbens, 1961; Scudder and Beam, 1961; Teeters and Matza, 1959). Both journalistic accounts and sober investigation (Wilkins, 1963) suggest, moreover, that delinquency can no longer be considered merely a product of poverty and slums. It is moving across the tracks into the wealthier neighborhoods, and it may actually be increasing with the improvement in the standard of living (United Nations, 1960).

Whether or not an adolescent is classified as a delinquent depends on whether or not he is caught and brought to court. It also depends on the criteria for delinquency that are used by the courts and the enforcement officers. According to some very loose criteria, 100 percent of adolescents would be classified as delinquents. For what they are worth, the official figures point to the years 15 to 24 as the age group responsible for most of the aggressive offenses. For official delinquents under the age of 18, the most frequent offenses, apart from running away, are vandalism, auto theft, general larceny, and arson.

At one time juvenile delinquency was almost exclusively a male affair. Earlier statistics suggested fifty or sixty male delinquents for every girl officially noted. Girls have become more and more involved, however, and current rates are closer to four or five boys for every girl. The offenses charged against girls are chiefly running away, sexual promiscuity, petty larceny, truancy, and being generally ungovernable.

Delinquents' Knowledge of "Street" Argot

Each of 100 institutionalized delinquent boys (average 16.8) was matched with a nondelinquent for age, race, intelligence, and socioeconomic status. In addition to this group of matched pairs, other pairs (random pairs) were made up by matching each delinquent with a nondelinquent high school boy selected at random. The boys in these groups were tested for their knowledge of the argot used by street gangs. The slang words dealt with *drugs* (e.g.—"roach," "hype," "tea"); *gang life* (e.g.—"rat packing," "thump," "ranked"); *law enforcement* and *institutions* (e.g.—"juvie," "turn over," "busted"); and words for common things (e.g.—"crib" for residence, "bone" for dollar, "short" for car).

	Average Score		
Sample	*Delinquents*	*Nondelinquents*	*Difference Significant?*
Matched Pairs	17.7	10.8	Yes
Random Pairs	16.9	11.8	Yes

SOURCE: J. A. Kulik, T. R. Sarbin, and K. B. Stein, Language socialization, and delinquency, *Developmental Psychology,* 1971, 4, 434–439.

Delinquency is by no means a single homogeneous entity. The term covers both sexes and different offenses. It also includes different general patterns. And it is possible that delinquency is quite a different thing for the member of a delinquent gang, on the one hand, and the secretive loner, on the other. The loner, in turn, may be simply unable to control the impulse to "strike out," or steal some attractive object, or he may be a neurotic carrying out an elaborate plan to even the score, or to show his power. The gang, on the contrary, involves a certain amount of group loyalty and cohesion. The members of the gang resemble each other in their emphasis on masculinity, in their craving for excitement, and in their belief that status comes from cleverness, and from success in violent conflict. These values are not secret thoughts but are readily and incidentally revealed in talk. In a sense, they are socialized groups in definite conflict with the larger group.

When all officially labeled delinquents are lumped together and compared with nondelinquents we find a few items that seem to differentiate the one from the other. At one time conspicuous delinquency was largely an urban phenomenon, linked with slums and areas in transition. As pointed out, however, this picture is changing and suburban and rural areas are now also reporting a good deal of delinquency. Indeed, if we go by the confidential reports of adolescents themselves (Short and Nye, 1957), we might find as much delinquency in one socioeconomic section as another. In official figures, however, the ghetto and lower-class areas still contribute much more than their share.

In the home of the delinquent, whether in the slums or the suburbs, we often find harsh or indifferent parents. The father especially is likely to exhibit little warmth or affection. In some instances he is ineffectual and withdrawn (Glueck and Glueck, 1962). The delinquent feels little identification with the family and has little idea of any values that may be held (Bandura and Walters, 1959). Broken homes, or outside employment of the mother, once thought to be a crucial factor, now seem to be less significant.

One of the things that characterizes the delinquent is his distaste for school and all that it stands for. He dislikes school, wants to leave as soon as he can, and does poorly in schoolwork. He is particularly deficient in reading (Silberberg and Silberberg, 1971). But it is not only academically that he is a misfit. He does not get along well with other students, and has little interest in extracurricular activities.

Suggested Causes of Delinquency Since there are probably several different types of delinquency and since delinquency is a different thing for boys than for girls, it would seem foolish to try to find a single cause or even a small number of causes for this serious problem. The causes that lead the lonely, confused boy to set fire to a warehouse may lie in the area of general personality disturbance. These causes may not apply to the member of the gang who cooperates effectively and vigorously in the execution of an illegal raid. Here we might wonder how he "got mixed up with the wrong group," or how he failed to progress from loyalty felt for the immediate group to a more diffuse loyalty to the larger group.

A number of investigators (Silberberg and Silberberg, 1971; Hunt and Hardt, 1969) are impressed with the parallel between two kinds of difficulty. They see some things that are common to delinquent behavior—especially the more aggressive type of delinquent behavior—on the one hand, and academic difficulties—especially reading difficulties—on the other. Both categories contain more boys than girls. Boys in either category show marked impulsiveness, inability to pay attention for long periods, and great dependence on concrete examples with the associated unhappiness over abstractions or symbols. From studies of brain waves and other neurological data, the Silberbergs suggest the possibility of brain deficit, or brain damage at birth or later. Such damage at birth, by the way, is more prevalent in lower-class areas. The Silberbergs also raise the possibility of genetic factors producing more general personality patterns, which, interacting with an unfortunate environment, may increase the likelihood of delinquency. This genetic possibility, however, is most repugnant to many people (see Chapter 3) and, whatever its intrinsic merits, is not widely considered.

No one, of course, denies the likelihood that an unfortunate environment may play a part. Some living conditions permit litttle opportunity for legitimate achievement and do little to make adolescents fond of the larger social order. Harassed parents fail to develop strong ties with their children. Other investigators, of course, will hasten to warn us that this direct environmental hypothesis should not be overworked or certainly not oversimplified. Ordinary slum clearance, for instance, has little effect. In the most careful investigations, moreover, general living conditions have been held constant, and even in these comparable living conditions, widely divergent, but systematic, patterns of delinquency have emerged.

Many studies (Hunt and Hardt, 1969; Bandura and Walters, 1959; Glueck and Glueck, 1950) suggest that one of the outstanding characteristics of the delinquent is his lack of moral understanding. In moral notions, delinquents resemble much younger children. Like younger children, they are susceptible chiefly to fear and to immediate punishment. The delinquent is remarkably deficient in self-criticism, and seems to have little Intellectual Achievement Responsibility (Chapter 12). If things go wrong, it is never his fault. He has a distorted picture of his own powers and no true appreciation of the probable consequences of various acts. He retains the tremendous egocentricism of the younger child and can seldom see things from the point of view of the other person. This lack of perspective is typical of general cognitive immaturity (Chapter 3) and of the more infantile stages of moral development (Chapter 12). The delinquent is similarly immature in his insistence on immediate gratification. When given a choice between a small, immediate reward and a much larger one that might come later, he shows a preference for the small, immediate reward (Mischel, 1961).

Delinquency as Direct Learning High-delinquency areas seldom have much to stimulate constructive activity or wholesome recreation. There is idleness, frustration, hopelessness, and much opportunity for furtive activity, to say nothing of countless examples, and overt instruction, in the criminal arts. According to some sociological theories, in fact, this general environment is the actual determining factor. For other theories, the deplorable conditions provide an outlet for the more important inner mechanisms.

To the proponents of direct reinforcement, it is not surprising that delinquency develops in settings such as these. We are certainly not surprised when children growing up in aggressive, primitive groups take on the hostile qualities they see portrayed. Similarly, we should not be surprised to see a child in our society take on the characteristics of his home or subculture. His parents, in administering frequent physical punishment, provide an early model of physical aggression. On the street he sees high-prestige figures engaging in violent aggression, and, too often, gaining admiration and material goods in the process. In some areas these models are seldom punished. Under these conditions children are exceedingly likely to imitate the delinquent acts they see.

From interviews with delinquents (Rivera and Short, 1967) and from general observation (Sarason, 1970) it is clear that boys in some cultures have little opportunity to model themselves on law-abiding, socially responsible males. For many of these boys the most significant adult in their lives is a woman. The men who do play a significant part are often little disposed to worry about the moral development of the young people.

Often both example and opportunity are likely to suggest delinquent behavior. Once entered upon, delinquent behavior is bound to bring a great deal of reinforcement. Detection and punishment are sporadic and often come long after the event. Meanwhile there are the inevitable and powerful reinforcements from the thrill of successful risk taking and from being taken seriously by one's fellows. After all, much as we may lament the fact, many delinquent acts are fun. They bring a host of the *effectance results* (White, 1960) that meet powerful needs in most people. A boy gets interesting results when he throws snowballs at top hats, turns in a false alarm to the fire station, or actually sets fire to a building. Behavior that is so regularly reinforced and so sporadically punished may be extremely hard to extinguish.

Community Improvement as a Preventative or Cure A problem so extensive and so serious as delinquency is bound to attract a good deal of attention (Wilkins, 1961; Witmer, 1959). A small volume is required merely to list the titles of the projects undertaken in any one year (Tait and Hodges, 1962).

Often, when delinquency reaches a certain point, a community will mobilize almost all its resources. Recreation centers are established. Specialists are assigned to police forces. Service clubs provide interested leaders. Frequently such an all-out program is followed by some feeling of improvement (Witmer, 1959). Lacking a control group, however, it is difficult to know just how much of the improvement can be attributed to the overall program, and it is certainly impossible to know which particular facet should receive the credit.

Effects of Group Counseling If delinquency is largely a product of unfavorable living conditions, then massive community improvement would seem to be the answer. If, on the contrary, delinquency arises largely from some personality quirk within the individual we might pin our hopes on counseling or on more extensive individual therapy. There have been a number of heroic endeavors along this line, but so far with most discouraging results (Sowles and Gill, 1970).

In the famous Cambridge-Somerville study (McCord and McCord, 1959), potential delinquents were located and half of them were counseled systematically, whereas the rest of the boys were left to their own devices. Both groups were followed through the years and into adulthood. To the disappointment of everyone, there were no dependable differences in the delinquency rate of the two groups.

A later study in Washington, D.C., was organized through the schools (Tait and Hodges, 1962). Special workers in one school were assigned to work closely with potential delinquents. In another school there was no such effort. Here again, we find a grim failure. There was just as much, perhaps more, delinquency on the part of the treated group as on the part of the untreated controls.

Sympathetic Adult Associates In the investigations of counseling, the adults made no attempt to suppress their advisory role. However sympathetic or understanding, they must have stood for the adult world and its values. In contrast to this approach, young adults have attached themselves to adolescent gangs, taking on the status of one of the crowd. Having obtained the confidence of the groups, they gently and discreetly try to influence some of the group decisions to more socialized objectives. Here again the success is difficult to determine. There is some claim that such "street workers" have reduced overt warfare between rival gangs. Less dramatic matters, however (occasional stealing, exploitive sex, drug experimentation), seem less affected.

Behavior Shaping As in other areas, behavior shaping in the field of delinquency takes little account of the underlying causes of delinquency. Its proponents simply assume that by a program of contingent reinforcement they can lead the delinquent to behave more in accord with the standards of society, or with the standards of the therapist.

Many of the investigations of behavior shaping (for a collection of reports see Purnell, 1970, pp. 344–376) have attacked only minor aspects of delinquent behavior (attendance at interviews), or even such academic correlates of delinquency as poor reading (Bednar and others, 1970). In the areas investigated, however, some progress has been reported.

Delinquency and the Schools Obviously the school is intimately connected with the issues of delinquency. For many a delinquent, the school exemplifies and brings to a head the frustrations and irritations with which he has to contend. The school symbolizes organized, rational society. It demands much immediate restraint in the interests of a later gratification—a gratification that may not mean much to the delinquent in the first place and has little appeal when it exists only in the problematic future. The school glories in the abstractions and the symbolic skills that give him trouble. In this school he is destined to failure and rejection. If he has delinquency in him, this is where it will show up. And the predelinquent's consistent rejection of the school and its values is one of the definite indicators of the larger problems in which he will be involved.

The school is a touchstone test to reveal incipient delinquency. Can it also do something to forestall that delinquency or to correct it once it has happened? This question is treated in Chapter 14 as part of the school's general role in socialization. Meanwhile, remembering the outcomes of more general remedial efforts, we will not be too sanguine.

Drug Use and Drug Education

Whereas the activist tries to reform society, and the delinquent strikes out vigorously but selfishly and blindly against it, the drug user drops out. He lets society with its excessive demands go its own way and seeks a life of irresponsible hedonism. When delinquent gangs are induced to give up their active or violent search for kicks, they may turn to drugs. This is especially true of boys who have been relatively unimportant in the gang life (see Short, 1966, p. 461).

Extent and Type of Drug Use Although exact figures are not available, youth workers have little reason to doubt that drug use among adolescents has become significantly and progressively more widespread during the past several years. Of the various substances associated with this trend, the *hallucinogens* (marijuana and LSD), deliriants (airplane glue and aerosol sprays), and *depressants* (barbiturates) are most frequently used by adolescents. Other substances, however, are also widely used. These include the stimulants (cocaine and amphetamines) and opiates (heroin and morphine). Deliriants and depressants are used most frequently by younger (11–14) students, perhaps because these substances are highly accessible. Older (15–19) adolescents are increasingly experimenting with hallucinogens, especially marijuana (Wolk, 1969). Social-class variations are apparent, with the opiates and stimulants more frequently found among adolescents from lower socioeconomic backgrounds (Akers, 1970).

The tremendous adult agitation over adolescent drug use is understandable and some concern is clearly called for. Even long-used drugs such as alcohol, tobacco, and caffeine bring visions of social distress and physical disaster. And the less familiar drugs invoke all these worries plus the dangers of the unknown. On hearing accounts of experimentation with the deliriants, the mind rushes to the possibility of long-range *habituation*, in which the tobacco or marijuana becomes necessary for a sense of well-being (psychological dependency), and beyond that to the horrible dangers of *addiction* in which the tissues themselves require larger and larger doses of heroin or other opiates. With this addiction we associate complete moral breakdown and dangerous contacts with the underworld, or even the gruesome role of pusher. Even in contemplating the nonaddictive hallucinogens, many adults fear not only danger to health but also foresee delinquency and sexual promiscuity. Conflicting reports and scientific

Drug Use in the University: Practices and Attitudes

From 600 invitations, some 497 students in a western graduate-undergraduate university (enrollment 12,000) agreed to answer an anonymous questionnaire dealing with drug use and other kinds of behavior. Answers to some of the questions are reported below. All numbers refer to percentages.

How frequently do you take drugs such as marijuana or LSD?

Replies:	Not at all	Less than once a month	1 to 4 times per month	Almost every day
	79%	6.0%	13.0%	2%

Of the 219 reporting some drug use, all mentioned marijuana, and about one-fifth of this group mentioned LSD.

		Type of Drug		
Questions (not quoted verbatim)	*Answers*	*Alcohol*	*Marijuana*	*LSD*
How often do your acquaintances use the drugs listed to the right?	Frequently	47.2%	14.1%	1.2%
	Occasionally	36.9	24.5	8.8
	Seldom	10.0	18.9	16.9
	Never	2.4	30.7	53.8
	Don't Know	3.5	11.8	19.3
What is your attitude toward the taking of the listed drugs?	Approve	70.6	35.1	4.8
	Undecided	22.2	31.5	20.9
	Disapprove	7.2	33.4	74.3
Has much pressure been put upon you to use the listed drugs?	A great deal	12.9	3.0	2.8
	Some, not much	38.2	16.5	2.0
	Very little	47.0	78.1	92.6
	No answer	1.9	2.4	2.6

In general, marijuana users were adherents of the unconventional or "hang loose" ethic.

SOURCE: Edward A. Suchman, The "hang loose" ethic and the spirit of drug use, *Journal of Health and Social Behavior*, 1968, 9, 146–155.

ignorance on these matters do little to reduce these fears. The use of the hallucinogens—marijuana in particular—is often perceived as representing a life-style incompatible with basic traditional social values (e.g., responsibility, competitiveness, rationality, deferred gratification). Thus, for many adults, widespread drug use may imply a threat to the existing social order (Kaplan, 1970).

For educators, these concerns and the facts that give rise to them are serious matters. Even "drug-pushing"—one of the ugliest aspects of the problem—is a serious issue for the schools. Nor can the schools be indifferent to the long-range effects of drugs on personality and social effectiveness, to say nothing of their effects on academic progress. To deal with these problems more intelligently, we should consider the forces that may be operating in the adolescent's use of drugs.

The most common reasons that adolescents give for taking marijuana, to use one example, include curiosity-seeking, peer-group conformity or social acceptance, tension relief, thought stimulation, the "thrill" of experiencing a psychotic-like state, and unhappy home life (Vincent, 1969; Keeler, 1968). Psychologists studying the problem have stressed a variety of general factors that may be at work.

Widespread Dependence on Pills and Medicines Using the word "drug" in its larger medical sense, we can see how the adolescent, particularly the American adolescent, lives in a culture that relies strongly on drugs and chemicals to eliminate its distress. A special pill for every ill, or perhaps an all-purpose pill for any ill. For any distress, ranging from a stubbed toe to the desolation of bereavement, we reach for aspirin, tranquilizer, or sleeping pill. We feel outraged when no one has worked out a potion for our discomfort. Few adolescents could escape the impression that chemical relief is the natural and legitimate correction for ills of the flesh or the spirit.

Beyond this widespread reliance on pills and medication, many adolescents are familiar with adult use of alcohol, tobacco, or "harder" drugs as means to conviviality, reassurance, relaxation, or temporary oblivion. To many adolescents, the taking of one drug or another cannot be considered as something monstrous, inhuman, or even especially noteworthy.

Initial Experimentation: Curiosity and Forbidden Delights Any adolescent must feel some curiosity about the well-publicized drugs. And a sense of devilishness and risk and of being "with it" must have a powerful appeal. When this becomes part of the group ethic, there comes also the urge to conform and to avoid the impression of being a sissy or a square.

Drug experimentation is also one form of the defiance so dear to many adolescents. The fact that it is forbidden and contrary to the official code makes it all the more attractive. For the youngster it is like the furtive smoking of cigarettes. For the older adolescent this rebellion may be more systematic and deliberate. It may be an explicit demonstration of independence, hostility, or contempt for an adult establishment that he regards as hypocritical.

For the great majority of those motivated chiefly by curiosity, this period of experimentation is fairly brief, and involves little serious distress. Having satisfied his curiosity and being aware of actual or possible problems, the youth simply quits (Cwalina, 1968). He seldom goes on to the more addictive opiates.

For those expressing deep-rooted hostility, however, things may not be so simple.

Adolescents driven by strongly entrenched pressures are more likely to persist in their experience with drugs, and this experience, unfortunately, may quite readily provide much reinforcement (Akers, 1970). Even those who begin in an idle, playful way may also be affected or trapped by the dramatic reinforcement encountered, and may become habitual users.

Escape and the Feeling of Competence Escape, of course, is one of the most sought-after effects of many drugs. And many adolescents, as we have pointed out, are burdened by troublesome feelings and frustrations. Escape seems most attractive. Some of these young folks feel guilty about their sexual or aggressive urges (Flynn, 1970). In this respect, as it seems, hostility may work in two ways. Overt hostility may lead to drug taking as an act of defiance (see above). Suppressed and guilty hostility may be assuaged by the effects of drugs. It is not surprising that heavy users of some drugs (the hallucinogenics) are characterized by high levels of hostility (Allen and West, 1968; Edwards, Bloom, and Cohen, 1969). Other feelings of inferiority or dissatisfaction with the self can similarly be reduced in dramatic fashion by the use of drugs (Brehm and Back, 1968).

Relief from pain or distress is one of the most striking forms of reinforcement. This is especially true where the onset of release is sudden. No wonder that those afflicted with distress should be inclined to try a drug again. Along with this negative reinforcement, many drugs lead to a positive euphoria and sense of worth, when "all the world is none so bad, and I myself a sterling lad," or when, "kings may be blessed, but Tam was glorious, o'er all the ills of life victorious." This synthetic achievement of competence and well-being must also be markedly reinforcing. Finally, these experiences may take place in the company of associates, and there may be a feeling of heightened camaraderie, social appreciation, and solidarity (Akers, 1970).

In view of these unfortunate reinforcing effects, it is not surprising that some experimenters become more deeply involved. Many of these, however, soon become aware of the difficulties they are creating and may seek to abandon the habit. Some of those seeking to free themselves will succeed on their own. Others may really need professional help (Cwalina, 1968). Finally, of course, there are those unfortunate few, often obsessed with problems and inadequacies, who become the victims of these synthetic reinforcers, and who move on to more powerful doses of ever more addicting drugs.

Drug Education In an area so urgent, and so frightening to many people, it is unfortunate that so little is known about the effectiveness of different approaches to drug education. There is even much uncertainty about what the schools would be justified in attempting. It is not surprising that many schools may still lack a definite program (Bland, 1969). Recommendations for such programs call for an emphasis on prevention as well as rehabilitation when that should be necessary. Schools are reminded that they are in an excellent position to present factual information about drugs—their important medical uses, the well-documented dangers of side effects, and the worrisome and lurking uncertainties surrounding any drug, especially a new one. These should be presented factually, with no sensationalism, and a minimum of moralizing. Doubts should be admitted. The drug effects stressed should include well-known changes in life-styles and social relations. Students should be given as much responsibility as possible in planning and in carrying out the program, and in the actual sessions there should be every encouragement for free discussion (Merki, 1969; Wolk, 1969; Pollock, 1968).

In the minds of many students, drugs, like sex, may be their special thing, and they may be disturbed when they see decaying oldsters well over thirty trying to insinuate themselves into this youthful party. Perhaps we have no choice but to intrude, but we might be able to leave much initiative in their hands.

Summary

In spite of the problems it presents, adolescence is a fairly smooth transition from infancy to adulthood. Roughly synonymous with the teens, adolescence begins with some sign of sexual maturity (appearance of pubic hair, period of rapid growth, menstruation). These occur at widely different ages in different children. Effective reproductive ability is some years later, and the termination of adolescence is considered to come later still, with the attainment of self-governance. Physical changes in body build affect personality and the self-concept. Sexual urges and powers bring various kinds of sexual activity and pronounced changes in interest and attitudes. Cultural and peer pressures play a part. The dating of adolescents differs from the prevalent preadolescent practices.

Some aspects of cognitive development (fluid intelligence, mastery of formal operations) may reach their peak early in adolescence. At this time the adolescent confronts the identity crisis and the decision regarding his role and commitments to society, especially to its vocational and ideological facets. The increased demand for autonomy and independence may bring problems with parents, but for the typical adolescent himself, this is not traumatic. Relations with friends and age-mates become more important than ever.

School figures prominently in the life-space of the adolescent, and symbolizes his agitation over many general issues (friends, authority, independence). Substantial numbers of adolescents drop out. These students often come from strict homes placing little value on education. Often their dissatisfaction is obvious before they actually leave. Some schools are better than others in combating this problem.

In helping a student select a career we can match his abilities with the requirements of known jobs, or we can stress the congruence of the job and the student's self-concept, or his basic need system. All approaches demand that the student give serious thought to the problem.

Socialization pressures during adolescence call for the regulation of sexual behavior, and this is managed differently in different cultures. Ours is on the restrictive side. Sexual restraint can no longer be induced by fear of pregnancy. Control must follow from ideals and respect for the worth of the individual. It has been difficult to supply the realistic sex education that adolescents desire. The physiological approach might seem more suitable for preadolescents.

Adolescence is the time of dissent. Targets for protest range from irksome rules and regulations to broad social injustice. Recently protest at the college level has involved a deliberate attempt to make the "establishment" reveal its alleged harshness. The increase in dissent may come partly from the swelling frustration of larger numbers of young adults continuing in a childlike role. Protesters include both dedicated social idealists, often from liberal homes, and the bitter, alienated student expressing his personal dissatisfaction. Often there is no desire for quiet rational discussion. The more idealistic protesters may represent a continuation of an earlier "liberal" ethic. Other protesters may represent a youth culture with its own standards and values.

Delinquency is an adolescent phenomenon. Information about this social problem comes from the study of the few delinquents actually apprehended, and of the still smaller number voluntarily cooperating with investigators. The delinquent loner may carry a grudge, or may merely be unable to control his aggressive impulses of the moment. The delinquent gang, however, is highly socialized within its own framework. Its rules and values are the subject of much talk. Delinquents of either type often have harsh and indifferent parents. They dislike school, and experience failure and rejection. Causes are difficult to determine. They may involve personality disturbance, love of excitement coupled with inadequate grasp of moral understanding. There may also be neurological disturbances. Many delinquents have ample opportunity to observe, imitate, and learn delinquent acts. Often these are quickly reinforced. Formal counseling does little to correct or prevent delinquency. Sympathetic adult associates often report that they have modified some of the behavior of street gangs. Behavior shaping has also been held to modify some incidental aspects of delinquency (attendance at counseling sessions).

Unlike the acting-out delinquent, the drug user drops out of society and seeks a precarious hedonism. The use of marijuana especially has been growing among adolescents. But experimentation and occasional indulgence are more typical than definite addiction. Curiosity and the desire to be "in" are the chief motives. Behind this is the general adult dependence on drugs, and the urge to show contempt for hypocritical adult values. For most adolescents, usage ends after brief experimentation. For some, relief from tension or pain proves tremendous reinforcement, and habituation may result. To combat these dangers, programs on drug education have become very prevalent. There is much emphasis on a rational, honest approach without overemphasizing the well-known horrors of the subject.

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Education Development Center

14

The School in the Process of Socialization

In discussing the various facets of character and the process of socialization, we have frequently mentioned, in passing, the role of the school and the problems faced by the school. At this point we examine in more systematic fashion the part the school plays in this whole area. We consider the tools at its disposal and the things it might be expected to do in some of the more crucial aspects of socialization.

The School and the Mechanisms of Socialization

The school, like many other social agencies, has typically shown a proper concern for decency, morality, and character. Indeed, in many a statement of school objectives the development of character stands high on the list. But along with these general concerns, which it shares with the home, the church, and general social agencies, the school and the academy have had a set of unique concerns, concerns that are conspicuously associated with it in the public mind. The terms "academic" or "scholastic," when used to describe a topic, are not meant to suggest character and surgent social participation. On the contrary, the terms suggest such things as theory, intellectual niceties, and other topics somewhat removed from the pressing concerns of daily morality.

The School's Concern for Socialization

Whatever may be the grand background hope of education, the minute-by-minute activities have revolved around things like reading, history, science, literature, and mathematics. Teachers have been selected for their competence in these areas (and in pedagogical skill). As teachers, we are not required to pass examinations in ego integration, altruism, magnanimity, and surgent commitment to a social cause. It is assumed, of course, that we have no criminal record, and that we are not markedly deficient in these more positive moral attributes. But in the steps taken to select us and to supervise us, we find more emphasis on our performance in the academic areas of the school's traditional concern.

But traditional function is not the only thing that matters. In spite of its reputed and actual preoccupation with science and literature, the school is the agency that comes to mind whenever there are signs of a breakdown in some important area of socialization. Whenever people suspect a serious deficiency in some vital area they suggest school "courses" in such things as sex, drugs, the cultural contribution of black people, or the attainments of women. This eyeing of the schools, of course, is quite natural. It is in the schools that young people are to be found. The school is the most conspicuous youth-oriented social agency over which there is any public control. The school is staffed by experts in the art of instruction. If teachers can provide instruction in the history of Phoenicia, surely they could, if only they would, take care of ambition, loyalty, and sexual decency!

That, of course, might well be one of our basic questions. Dominated as they are by outlooks appropriate to academic areas, and using tools developed in those areas, can the schools confidently take on major responsibilities in the larger areas of socialization? But this question, although very real, is too large for our purposes. Whatever its hopes for substantial success, the school has no choice but to do what it can in the urgent problems of socialization. A more realistic question, then, would be: What is the school's most effective role? What special problems are faced, and what techniques are demanded, in adapting traditional educational procedures to those issues of socialization now pressing so urgently on society in general, and the school in particular?

Reservations and Reassurances

In any important venture it is most important to look honestly and openly at the difficulties that confront us. This does not mean that we should cower, frightened and helpless, in the face of those difficulties. Nor does it mean that we should turn this search for difficulties into a way of life, dwelling lovingly on each obstacle and triumphantly whomping up one farfetched problem after another. The more serious and legitimate issues, however, should receive their due attention. Typically, this does not mean that we will call off the enterprise. At the very least such an analysis should forewarn us and prevent shattering disillusionment later on. Beyond that, a searching look at these problems may lead to an ingenious method to circumvent them, or it may show the efforts needed for their resolution.

The Problem of Stages Although there are reasonable grounds for optimism, there are also some reservations and problems to be kept in mind. If Freud, Erikson, Piaget, and Kohlberg are right, the school's efforts must be geared to a moral stage that the child has reached. A stage cannot be skipped, and there is a question as to how much it can be hastened. Several of these theorists, moreover, hold that the experience essential for the attainment of the stages comes overwhelmingly from the home, or from the vital interactions with other children, and only slightly from formal programs of training.

Out-of-School Reinforcement Theories of social learning would seem to stress mechanisms readily available to the school. Even here, however, there are reservations. The reinforcements stressed so consistently in these theories come from many sources—physiological, physical effects, and social reactions. The school leans heavily on such social reactions as approval, disapproval, success or failure, and for the teaching of reading and mathematics these may be the reinforcements that count. In teaching sexual restraint, or the avoidance of drugs, however, the approval or disapproval of the teacher is overshadowed by the immediate sensations arising from sexual indulgence, or by the prompt onset of euphoria following the injection of a drug. In teaching arithmetic and reading, moreover, the teacher has almost complete control of all the social reinforcements that really matter. In more vital areas, however, social reinforcement —approval or disapproval—comes not only from the teacher but also, and more compellingly, from sexual partners, members of the group, or fellow indulgers in drug experience.

It is not surprising that many of the early empirical investigations (Stephens, 1967, Chap. 9) show only meager success, or no success whatever, in the school's efforts to teach honesty, fair-mindedness, and enlightened concern for others. Some successes are reported, however, and these will be stressed. There is some hope, moreover, that the somber picture emerging from the early studies may be relieved by more encouraging results recently reported. These are considered in the general overview of this whole issue.

The Complexities of Reinforcement

Reinforcement is a very pervasive phenomenon, and often comes into play in ways that are not intended. This has considerable significance for the socialization that goes on in the classroom. Because of dependency motivation, some reinforcement will occur whenever a child, feeling lonely or neglected, is noticed, especially if he is noticed favorably (Sears and Hilgard, 1964). Whatever the child is doing at that time would tend to be reinforced. It is possible that a pupil, perhaps because of the frustration produced by his feeling of neglect, may torment a younger child and be reprimanded by the teacher. This very reprimand, however, may help meet the need for recognition, and thus reinforce the unsocial act it was intended to discourage. Theoretically we can reduce this danger by trying to make sure that dependency needs are met fairly well most of the time. If they are at reasonable adaptation level, as in a congenial accepting atmosphere, an ordinary caution from the teacher would not constitute a noteworthy increase in attention.

The theorists who stress direct reinforcement would also warn us about the dangers in a harsh and punitive atmosphere. The dangerous side effects, ironically enough, come from the fact that at unpredictable times the harshness is bound to be alleviated and the persisting threat of punishment is bound to be reduced. The teacher may smile in spite of himself. This alleviation of the grim atmosphere provides one of the most powerful kinds of reinforcement. Such inadvertent reinforcement will encourage all acts being carried out at that moment, however desirable or undesirable. Such inadvertent negative reinforcement would be less likely to occur if the general tone were more pleasant to begin with.

Identification and Imitation

The two interrelated forces of identification and imitation (Chapter 12) are inevitably at work during the sustained contact between teacher and child. Literature and biography include accounts of many students who have strongly identified with some notable teacher and, whatever his makeup or intent, the teacher is likely to function as a model for an undetermined number of his pupils (Adelson, 1962). He might occasionally stop to ask if he would be happy to see a number of his students acting as he does. Most teachers, of course, will be reluctant to strike an artificial pose for the purpose of presenting an effective model. Such priggish behavior might in itself constitute an unfortunate model. But with no violence to his integrity he could accentuate this feature of his true self, or curtail actions that he would like to curtail anyway.

The Male Teacher as a Model Many children have very little association with a reasonable male model. On the one hand, we hear about the upper-middle-class home where the father is merely a weekend visitor. At the other extreme, we know of the occasional lower-class matriarchal home where the only males in evidence are the current, but transient, boyfriends of the female members of the household. For either group, the male teacher might provide a valuable additional image of masculine behavior (Ostrovsky, 1959).

Aspects of Adjustment Stressed by Men and Women

As part of another investigation, 17 women and 22 men, all teaching in the same high school, were asked to nominate the three best-adjusted students in the school and the three poorest. They were then asked to give the characteristics of each student that led him to be named well adjusted or poorly adjusted.

	Percent of Teachers Mentioning a Given Area When Describing:			
	Well-adjusted Students		*Poorly Adjusted Students*	
Area Invoked	*Women*	*Men*	*Women*	*Men*
General emotional and personal adjustment (mature, good judgment vs. show-off, unstable)	82.3	100	82.4	81.8
Character control (good manners, honest, modest vs. unreliable, tale-bearer, liar)	94.1	72.7	82.4	63.6
Social-interpersonal (good mixer, friendly, likes people vs. lone wolf, shy, standoffish)	88.2	77.3	70.6	63.6
Cultural, academic attainment (ambitious, industrious, persistent vs. no goals, lazy)	88.2	72.7	47.1	63.6
Ability and interests (ideas, creative vs. dull, slow to learn)	23.5	18.2	41.2	18.2

SOURCE: H. Beilin and Emmy Werner, Sex differences among teachers in the use of criteria of adjustment, *Journal of Educational Psychology*, 1957, 48, 426–436.

It should be useful for both sexes, of course, to see men as a normal part of their daily lives. The presence of the male teacher, however, has been considered especially important for boys (Williams and Johnston, 1970). The special needs of boys may have been somewhat neglected in the current school. In the typical class most of the approval goes to girls (Meyer and Thompson, 1956). Boys, moreover, stand in need of a special kind of support (Bronfenbrenner, 1961). And there is some evidence that male teachers are more likely to provide the needed emphasis on independence and maturity (Beilin and Werner, 1957). Female teachers are more likely to stress conformity and modesty.

Models from Literature and Subject Matter If we face some embarrassment in casting ourselves as models, we can, with good conscience and with tremendous relief, turn to the great and vivid models of history and literature. In contrast to the faltering and confusing images that we ourselves may present, most of the inadvertent gaucheries of these historical characters either have been deleted from the story or have been subordinated to a minor place in the total structure. We hope, of course, that literature or history does not become a mere vehicle for moral preachments. But even when taught for its essential content, the material may well present some of its conspicuous characters as worthy models.

We will be fortunate when we can find characters that exemplify the traits we have in mind and that do so with a minimum of confusion and hesitation. We should be careful, however, not to push this matter too far. Characters should still be presented in the round. As pointed out earlier, stylized caricatures or cartoon characters do not serve as compelling models. If literary characters are to function as effective models, moreover, they may have to form some link with live people who have played a part in the student's life. Obviously we cannot predict just which facet of the literary character will present this all-important link. It may be that some minor aspect of the hero resembles some characteristic of a father who is beloved but insufficiently available. The attraction may come, on the other hand, from the very contrast with some earlier idol who has cruelly shown himself to have feet of clay. Since the particular link is so unpredictable, we would be wise to see that each character is presented in some detail, in the hope that some one of his characteristics may act as a connection with an important person in the life of some child.

In literature, as in life, the effective model must be successful. For young children, the success should be obvious and overt. The eight-year-old may not be impressed by the hero who loses the world but gains inner tranquillity. Virtue should prosper in some tangible manner. The character selected as a model should also be portrayed in a generally approving manner and should carry a reasonable amount of prestige. In all this, by the way, we should not hope for miracles. We must face the fact that students exposed to biographical materials do not always identify with the characters presented (Lodge, 1956).

In the bulk of our teaching few of us will be willing to distort the story in the hope of getting a more pointed moral. At times, however, particularly at the high school level, we could use a literary work as a jumping-off place for explicit discussion of moral concerns (Havighurst, 1962). High school students are often interested in moral issues for their own sake and could well regard the occasional play or story chiefly as an illustration of a moral question.

Cognitive Transformations and Classroom Strategies

Offhand it would seem that the socialization mechanisms most available to the school would be those dealing with moral understanding. In attempting to refine and elaborate the student's grasp of moral matters we must gear our efforts to the moral stage he has already reached, and to the moral issues he has already faced. Kohlberg (1970, 1969) is most insistent that the student cannot hope to work out the problems of stage four, for instance, unless he has mastered stage three, and unless he has firsthand experience with the moral questions involved in stage four. He must also see that the structures on which he relied in stage three are not adequate for these questions that confront him. He is more likely to do this if he faces genuine moral issues which are not easily resolved by his present moral structures but which would be better managed by the structures of the next stage. To make sure that these new structures will excite his interest, we must be sure that he feels some disquiet as he works over these problems in terms of his present moral structures. He must face genuine moral conflict.

Other Children as Tutors When working on his own with a child in (say) stage three, the teacher's goal should not be the teacher's own structures of (say) stage five or six but the structures of stage four which, to the adult, leave much to be desired. To contrast the limitations of stage three with the virtues of stage four, the teacher may have to pretend an appreciation of the stage four structures. To get around this problem, to produce other benefits, Kohlberg and his associates have pitted students in stage three against other students in stage four (see Kohlberg and Turiel, 1971). Obviously these recent converts do not take a patronizing attitude to the stage-four way of seeing things, although they can grasp what the younger students have in mind. It would be natural, moreover, if discussions of this kind concentrated on issues that meant something to the students involved. When such interchanges have been set in motion, the teacher's role would be that of clarifying the rival positions, pointing out relevant examples and analogies, and generally elaborating, enriching, and perhaps structuring the points already made. In this approach, the teacher should not introduce new or more advanced moral concepts.

Direct Experience with Moral Issues The final and functional moral structures will emerge, not from discussions of hypothetical issues, but from participation in real-life issues with all their bite, their complexity, and their serious consequences. But even within the school such participation is possible to some degree. In the business of running a school or class, there are endless occasions during which pupils are involved in moral issues, either in accepting rulings, in discussing them, or in actually formulating policies and decisions.

Cheating in schoolwork is a good example of moral issues that arise within the school. From investigations at the college level it appears that cheating in some form is very prevalent. Recent studies (Sherril and others, 1971; Knowlton and Hammerlynck, 1967) conducted in large state and urban universities suggest that one-half the students have cheated at one time or another. Others, not actively cheating, have allowed others to copy from them. For only about 35 percent was there no indication of any cheating at all. There is some fear that more and more college students feel that cheating is an issue of expediency rather than morality (Trabue, 1962). Student views include some very subtle distinctions with respect to the basic ethics involved (Anderson, 1957).

In using school situations to provide genuine moral experience, of course, the teacher faces some difficulties. In a true moral experience, the student must feel that he has the option to follow his standards or to depart from them, or, indeed, to be guided by standard *A* instead of standard *B*. In considering school rules and school practices, the teacher may find it difficult to think in these terms. To the teacher, conformity to school rules may seem a fixed requirement. So long as this is true, the student's moral problem is not to make a genuine moral decision but to reconcile himself to things he must do in any case. This, of course, is one very real facet of moral development, but it is not the same thing as wrestling with vital issues which have real emotional impact, and which may be experienced within different structures, perhaps the structures of stage three, perhaps of stage four.

To the extent that direct experience in moral issues is dangerous, or not easily available, teachers often make use of real-life incidents. Court cases have been used (Miller, L. N., 1957). Newspaper accounts present other possibilities. Along with their quota of phony and sensational items, the "advice columns" portray some intricate and serious ethical issues. And, as we have pointed out, literature provides a gold mine of such material.

Overt Preaching and the Dangers of Priggishness From stage theory we might expect only slight gains from overt moral instruction. True enough, the eloquent exhorter may, incidentally, present a model of someone with convictions he is proud to express. There is some evidence, moreover, that these direct approaches may have a modest influence when the students are older and need only "flesh out" the structures already achieved; when the students are reasonably well adjusted (Jones, V., 1960); and when they have developed a sturdy self-concept (Francis, 1962). It is the better adjusted student, presumably, who is more willing to "try on" new and risky attitudes.

Some people, of course, may well dislike a morality that might be overly deliberate and analytic. Sir Herbert Read (1960), for instance, holds that the truest morality is spontaneous or automatic. The left hand knoweth not what the right hand doeth. Most people, moreover, would be less happy about the smile from an acquaintance if he saw it as the result of a deliberate moral decision.

Other people, taking issue with such a stand, would hold that in matters of great moment, as opposed to the detailed acts of ordinary living, such an unthinking, automatic approach would be the negation of true morality. In considering a serious step that might affect the welfare of others, the higher reaches of morality might demand a deliberate calculation of obligations and demands.

To some extent, any school program could deal with such rival worries by adjusting its approach to the age of the child. Before the young child has developed the structures that enable him to deal with complex moral issues, the school might concentrate on simple behavioral shaping, taking note of kindly and considerate acts and reinforcing them promptly. When these more elaborate moral structures do develop, the curriculum might contain much material for ethical analyses.

Teaching General Attitudes and Beliefs

Socialization, as we have seen (Chapter 12), is directed not only to conduct but also to attitudes and beliefs. Most societies try to induce attitudes of loyalty to the group, or duty to one's fellows, and there is much agitation over religious and other beliefs. In this matter of beliefs and attitudes, the school might be asked to take considerable responsibility.

In this discussion we look first at some of the distinctive features of attitudes and beliefs and at the forms they may assume. We then turn to the more practical problem of molding or modifying these aspects of the student's life.

Beliefs, Attitudes, and Prejudices

Beliefs vary in the extent to which they involve feelings, the concept of the self, or a disposition toward action. A student, for instance, believes that Mexico City, being in the tropics, has a hot climate. This belief he could easily abandon upon being differently informed and upon being reminded about altitude. Apart from moderate surprise, there would be no wrench to his self-concept, or to his general feeling about the world. Ask him to believe, however, that our important national leaders are much like the hometown neighbors, and he may face a shattering sense of insecurity. Ask him to examine his contemptuous views of some minority group and you ask him to uncover some shaky props to his own sense of worth.

Beliefs are *about* people or things. Attitudes are *toward*. Under primitive conditions, your encounter with a stranger would be dominated by considerations of attitude. From his posture or facial expression, or his vocalizations, can you tell whether he is likely to attack you, to help you, to pay no attention to you, or actively to avoid you? This is his attitude. Conversely, your attitude toward another person (or group) refers to your general tendency to feel hostile, friendly, indifferent, or rejecting. Attitudes usually involve a number of beliefs. Such beliefs, unlike the beliefs about the climate of Mexico City, are often determined by the attitude.

We can have attitudes toward food, rock music, or clothing styles as well as toward hippies, or bankers. Prejudice, as used in this connection, however, almost always refers to people. Literally, of course, it means the tendency to make "prejudgments" about things, or, in this case, about people or groups. Because of an attitude already developed we make up our minds about a person or group before we learn the relevant facts. Such prejudgment, of course, could be favorable as well as unfavorable, and many a person will admit to being prejudiced in favor of English china, or Swedish movies. As used in group

Childhood Intolerance: A Reflection of Parental Intolerance? Or a Result of Parental Severity?

This investigation was carried out in Columbus, Ohio, and is based on 161 children in grades six and seven. The children were given a *social distance* scale dealing with ten different ethnic groups. For each of the ethnic groups the child indicated how close a relationship he would welcome or approve. This gave a measure of the child's prejudice or ethnocentrism. The mothers of the children completed a modified form of an ethnocentrism scale from the Authoritarian Personality, and also answered a questionnaire dealing with their views on child-rearing practices. The latter scores were used to indicate whether the mother had an authoritarian or a permissive attitude in the upbringing of children.

When allowances were made for the mother's views in child rearing, the correlation between the mother's ethnocentrism and the child's ethnocentrism was .33. When allowances were made for the mother's ethnocentrism, the mother's authoritarian views on child rearing showed no correlation with the child's ethnocentrism ($r = -.01$).

SOURCE: D. L. Mosher and A. Scodel, Relationships between ethnocentrism in children and the ethnocentrism and authoritarian rearing practices of their mothers, *Child Development,* 1960, 31, 369–376.

relations, however, the term now refers only to a tendency to believe the worst about a certain group, and an accompanying attitude of hostility, disapproval, rejection, or contempt.

Attitudes, Personality, and the Belief System

In remodeling a suite of offices, the shifting of one partition might have few side effects. A change in another wall might call for compensating changes or for adjustments of wiring or plumbing. A third change would endanger the structure of the entire building. We face a similar problem in attempting to manipulate beliefs. Some changes in belief involve little, if any, problems for other aspects of the person. Other beliefs are intrinsically incorporated into the belief system itself, and the prospects of a change in one of these might threaten the whole structure.

According to Freudian theories, a hostile attitude toward a group, or race, or nationality comes from displaced aggression. The hatred we cannot express for the powerful father is displaced toward some group which stands in contrast to the father—low status, with different mannerisms, different speech, or different appearance. According to the social learning theory, this hostile attitude is learned from parents or associates in the same way that speech patterns or food preferences are acquired. Within the cognitive view, these feelings of hostility and rejection serve to protect us from an unacceptable upset to our cognitive structure or belief system.

The Theory of the Closed Mind In the study of dogmatism and the closed mind (see Ehrlich and Lee, 1969; Vacchiano, Strauss, and Hochman, 1969; Rokeach, 1960), Rokeach and others have presented a picture of the person who has a neat set of beliefs and convictions and who strenuously resists any upset or alteration to those beliefs. The dogmatic individual carries around a basic set of such beliefs that are linked with his major interests and values. These he cherishes and protects, developing a violent antipathy to any person, or to any suggestion, that might threaten them. Regarding other less basic issues, and less familiar issues, he can often develop a separate set of beliefs, provided they threaten no upset to the more inclusive system. The dogmatic psychology student, for instance, will steadfastly refuse to give up the misconceptions he has held for some time. New facts or principles from neutral areas, however, he will pick up as readily as his less dogmatic classmates. As soon as he does accept these new facts, however, they also become a closed system and resistant to change. This phenomenon has been investigated in the solution of gamelike puzzles. Before starting on this new and neutral puzzle, the dogmatic student will accept a fairly extensive set of arbitrary facts or principles to be used. If given only a few facts or principles at the outset, however, he will accept these but will then resist or resent any modifications offered during the play. His less dogmatic colleague, on the other hand, does poorly when asked to swallow a substantial body of arbitrary principles at one sitting. He does much better when given only one such rule, and is less disturbed when asked to alter or amend this rule during the course of the play (Ehrlich and Lee, 1969).

The Role of Authority As suggested, the highly dogmatic individual relies heavily on authority and easily accepts information coming from an authority whom he acknowledges. He is less disposed to examine the information itself in critical fashion. For him, one idea emanating from an authority is the same as another idea from the same authority. The dogmatic student takes somewhat the same attitude toward tasks. One assignment coming from a legitimate authority has about as much claim on his interests or involvement as any other task coming from the same authority.

When the dogmatic person is led to give up one authority or one belief system, he changes, not to a neutral attitude, but to a similar unthinking adherence to a different authority, and often to a very different set of beliefs. There are blacks and whites, but few shades of gray.

The Correlates of Dogmatism On the average, the dogmatic person is rigid and dislikes novelty. But these attitudes work in a special way. The "rigid" problem solver (Chapter 8) often fails to see the shortcut, but gladly and sheepishly uses it when it is called to his attention. The dogmatic person, in contrast, refuses to accept the new version even when he can easily see it. On the other hand, he may accept a novel approach if it fits in with his basic belief system or strengthens it. More often than not, however, his belief system is threatened by novel forms in art, manners, or ways of life.

Prejudice and the Belief System

Just as dogmatism has complex linkages with rigidity, so it is linked with prejudice in a special way. It is possible that the threat to our valued beliefs may become associated with any individual or group holding contrary views. The very thought of such people may set off panic, and when this happens often, we come to dislike not only the threatening view but also the people who represent those views, or even those who remind us of the people holding divergent views. To the authoritarian, it will be remembered, the acceptability of a doctrine comes largely from the status or the authority of those holding the doctrine. Consequently, there is a strong temptation to undermine the status or moral worth of those holding the threatening views.

In this treatment of prejudice the theory of the closed mind differs sharply from the Freudian position. The Freudian view holds that prejudice is basically hostility toward the father which is now displaced to a weaker, defenseless group, not easily mistaken for the father. Thus it typically takes the form of persecution of minority groups in no position to fight back. In the famous California study of the authoritarian personality (Adorno and others, 1950), prejudice had a Fascist component, and authoritarianism was almost equated with such right-wing Fascist attitudes. According to Rokeach, however, the requirements of the dogmatic mind acting on left-wing extremists could induce prejudice just as extreme, and equally irrational, toward the middle-class establishment. Rokeach's dogmatism points to a generalized tendency toward condemnation of one position or another. According to Freud, prejudice is directed to powerless victims having identifiable characteristics (appearance, skin color, dialect, distinctive life-styles). Dogmatic prejudice is directed to those who seriously challenge or threaten our views. Often, of course, we attribute divergent and threatening views to those who belong to some "stranger" group.

In holding that dogmatism, once it develops, is the key to prejudice, the followers of Rokeach do not deny the possibility that dogmatism itself may be a defense mechanism protecting us from unacceptable urges or drives. The highly dogmatic show more than their share of other defense mechanisms (Vacchiano, Strauss, and Hochman, 1969) and are not only unwilling to consider new doctrines but are also reluctant to face new evils, such as the threat of blindness.

The Belief System and the Problem of Persuasion

Obviously, the problem of persuasion takes on a special character when we deal with the person who has a central set of precious, basic beliefs to be protected at all costs, and who quickly freezes his minor beliefs into a closed system that must also be protected, although less zealously. To persuade such a person we must work, not merely with one belief that we seek to change, but with the entire system into which that one belief has been integrated. The effect of any information we may supply will hinge, not primarily on the intrinsic worth of the information itself, but on the source or authority from which it is derived. To be effective, we must tap a higher level in the recipient's hierarchy of authorities, or we must show that our proposal is consistent with authority he does accept, or, in the most drastic alternative, we must topple the authority itself.

The beliefs of the dogmatic student, be he white racist or left-wing radical, are highly polarized. At one extreme he holds a cluster of views with complete conviction. Within this cluster there is no range of conviction. Each belief within it is just as true as any other view within it. The white racist may believe, for instance, that *on the average*, black children fall below white children on existing intelligence tests—a semifactual belief that many nonracists would accept. With the same degree of conviction, however, the racist believes that blacks are inferior to whites, period! The left-wing radical may believe that many policemen have used unnecessary force in suppressing riots and, with precisely the same conviction, he believes that there is a widespread, deliberate conspiracy to keep impoverished groups in servitude. In neither case is there any differentiation among the beliefs within the cluster.

At the other end of this polarized scale we find, for both kinds of dogmatist, a narrow cluster of rejected beliefs. All of these beliefs are rejected with equal certitude. Naturally the white racist rejects the idea of general black and white equality. He is just as vehement, however, in rejecting a less extreme view—*e.g.*, that *some* blacks are very able. The radical dogmatist, like everyone else, is convinced that many people live in deplorable conditions. He may be equally convinced that this reflects the deliberate wishes of some powerful group.

If we are to try to change any one belief of either dogmatist, we must realize that we are not working only with that one belief. We are working with the system. So long as a whole group of beliefs are held as a single cluster, we would have to convince our dogmatist that this whole belief system is wrong, and, short of a dramatic conversion, this is almost an impossible task. The strategy is to divide and conquer (Hovland, 1963; Sherif and Hovland, 1961). This time it is the beliefs that we separate and not the people holding them. In this somewhat Machiavellian approach we do not concentrate on the particular belief that we really want to change. We select, instead, the belief we consider most susceptible to change. We think, perhaps, that the white racist might be led to admit that "a few black children might respond to improved conditions." To achieve this result we try to detach this belief from the tight cluster of abhorrent beliefs. We get him to see that some beliefs of his opponents (e.g., complete equality between black and white) are even *more* ridiculous than this belief that a few blacks might be helped. When we have shown *any difference* in the acceptability of these beliefs, we have, in effect, detached this one view from the rest.

Great things are accomplished when one belief can be detached from an extreme cluster and moved into a zone of uncertainty—of possible but unlikely beliefs, for instance. The tightly held cluster has been spread apart. Now, moreover, we have a new *anchor point,* or *adaptation level* (see Chapter 4). Some beliefs can now be seen as even more plausible than the one just moved into the uncertain zone. This belief, now perceived in a different manner, becomes the reference point according to which other beliefs are judged. Some ideas proposed will now be seen as less plausible than the one view entertained. But the latter, by contrast, will make the first view seem even more plausible, thus moving the anchor point or reference point itself to a more favorable position.

The Psychology of Persuasion

When we are dealing with beliefs that are less firmly entrenched into a compact and valued system, we can move in more direct fashion and concentrate on the specific belief we have in mind. Clearly the techniques of simple persuasion are almost wasted on the hostile or suspicious bigot. They are most likely to be effective for a rather timid, depressed person who keeps his impulses under careful control. On the average, women are more susceptible to persuasion than men. Intelligence, as we might suspect, works both ways. The intelligent student will more easily grasp your point, but he is also likely to examine it more critically. If the topic genuinely permits or invites little disagreement, intelligence will help. When there really are several interpretations, however, the bright student may be less likely to adopt the particular interpretation you wish him to endorse.

Prestige and Fair-Mindedness The prestige of the persuader helps, and so does apparent freedom from bias. A speech favoring private development of power sites, for instance, will be quite effective if presented by the author of a book on the subject. The same speech will be less effective if presented by "a man in the street." It will also be less effective if presented by the manager of a private power company, or someone else who has something to gain from the policy he advocates.

Similarity and Affiliation Typically, people are more ready to dismiss the fear of dangerous bias when they see the speaker as a member of their own group, as far as this issue is concerned. Members of an oppressed group will be less suspicious of good faith if they see the speaker as one of themselves. Teachers might similarly be less on the defensive if the talk on teachers' unions is given by a fellow teacher. The effect of this feeling of affiliation or similarity depends largely on the issue being discussed. If the topic is international relations rather than teachers' unions, for instance, you might pay no attention to the fact that the speaker is a fellow teacher (Simons, Berkowitz, and Moyer, 1970).

Similarity, and the feeling of affiliation, not only affects assumed freedom from bias, but has a complex influence on prestige. Teachers hearing a talk on problems of classroom control might not feel that the speaker knew what he was talking about unless he had had classroom experience. At other times the speaker would lose prestige by stressing his role as one of the group. Someone addressing a lay group on the international money market, for instance, would gain little from assuring his audience that he also was a layman in this subject. Ideally the persuader will be most effective when he is regarded as somewhat similar to his audience (freedom from dangerous bias), but more competent (prestige) (Simons, Berkowitz, and Moyer, 1970).

The Value of Explicit Suggestion Typically, persuasion is aided by direct suggestion. The speaker is more likely to be convincing if he clearly points up the moral or brings out the conclusion to be derived from the facts he has presented. He is less likely to be convincing if he merely lets the facts or analyses speak for themselves.

Under some circumstances it is useful to give some attention to opinions contrary to the one being advocated. Bright students will suspect that there are two sides to the question and will be uneasy if only one position is mentioned. If for no other reason than to reduce this uneasiness, it is wise to make some acknowledgment of this difference of opinion. Some such acknowledgment is also wise when the speaker suspects that the present beliefs of his audience conflict with his own message. It is good strategy to summarize these prevailing beliefs and to use them as the point of departure for the views about to be advocated. Finally, the speaker may know, or suspect, that his audience will be exposed to rival views later on. Here, again, it is good strategy to deal explicitly with this rival view in the hope of building up resistance against it. History, by the way, provides a dramatic illustration of the effectiveness of this technique of forewarning. Shortly before President Truman announced the existence of a Russian A-bomb, it happened that a group of students, selected at random, had heard a talk showing how it would be impossible for Russia to achieve such a bomb for many years to come. These students were notably skeptical of the President's announcement—much more so than the students who had not heard the earlier talk.

But these are rather special circumstances. Under other conditions there may be little advantage to presenting both sides of the question. When listeners are of average intelligence, for instance, and when they are not already committed to one view, and when no predictable rebuttal is in the offing, a vigorous presentation of one view may be more effective than a balanced account of rival views. Ethical considerations may demand this, anyway, but it may not be necessary from the point of view of sheer effectiveness (Hovland, 1963).

When an audience does hear both sides of the question, the results depend on the manner of presentation. A vigorous partisan debate will typically strengthen the views each person had before the debate began. A balanced, judicious

Attitude Change After Different Amounts of College Attendance

Of the 2700 students tested upon entering Michigan State University in 1958, some 941 men and 836 women were available for retesting in 1962. Some of these had withdrawn before completing college. Others had completed college or were still enrolled when tested in 1962. The tests were (1) the Inventory of Beliefs (Inv. Blf.) in which a *low* score indicates a rigid, authoritarian attitude; (2) The Differential Values (Diff. Vals.) in which a low score means traditional values and a high score "emergent" values; (3) The Dogmatism Scale (Dogm. S.) in which a high score means a dogmatic attitude. For each test there is a report of the 1958 score and the change (+ or −) noted in 1962. An "S" at the top of a column means that the trend in that column is significant.

	1958 Scores			*Changes (+ or −) from 1958 to 1962*		
Years of College Attendance	*Inv. Blf.*	*Diff. Vals.*	*Dogmatism S.*	*Inv. Blf.*	*Diff. Vals. S.*	*Dogmatism S.*
(Men)						
Four (or still enrolled)	64.4	34.8	166.6	+8.5	−2.4	−12.3
Two to three	63.1	35.8	167.1	+9.0	−1.0	−14.7
One to two	61.0	35.7	172.3	+11.3	+0.1	−20.4
Less than one	57.0	34.7	172.5	+8.8	+1.9	−16.7
(Women)						
Four (or still enrolled)	65.9	34.2	163.1	(S) +12.7	(S) −4.6	−16.1
Two to three	64.2	34.5	163.9	+9.7	−1.8	−14.7
One to two	64.1	32.4	164.1	+8.2	+0.4	−15.8
Less than one	62.7	34.4	168.7	+5.8	+1.3	−17.2

SOURCE: Irvin J. Lehmann, Birendra K. Sinha, and Rodney T. Hartnett, Changes in attitudes and values associated with college attendance, *Journal of Educational Psychology*, 1966, **57**(2), 89–98.

summary of both sides, on the other hand, tends to moderate the more extreme opinions (Hovland, 1963).

One way to persuade a student is to assign him the task of trying to persuade others. Whenever a student is required to repeat, or act out, or present an argument that he has heard, he is more likely to be affected by the argument. This, of course, has its dangers. As might be expected, many students may resent having to expound a view that is not their own. And those who resent it most, change the least. But they all change to some extent (Hovland, 1963).

The Impact of School or College

As so often happens, when we move from a familiar area of endeavor into a more vital and complex area, we must brace ourselves for surprises and some disappointments. Whereas in the teaching of algebra and English we can regularly expect some modest returns for our efforts, in the teaching of attitudes, unfortunately, we must be prepared to accept considerable risk (Freedman, 1960; V. Jones, 1954). Successes are reported, it is true, but, mingled with these optimistic accounts, there are a large number of failures. From the earliest summaries (Lichtenstein, 1934) through the more ambitious practical projects (Peters, 1948), to the detailed later studies (Lehmann, Sinha, and Hartnett, 1966) we encounter the same picture of mixed results, with perhaps more failures than success. Jacob's review (1957, 1958) of some 350 investigations reported little change in college with respect to attitudes. The Jacob report has been followed by a flood of other summaries and reports (Eddy, 1959). Some of the general trends have been confirmed (McClintock and Turner, 1962; Freedman, 1960). Some changes in attitude, however, are reported (Webster and others, 1962). There is a change toward independence of thought, and to greater tolerance for expression of impulse.

The changes that do occur probably come early in the college program (Lehman, Sinha, and Hartnett, 1966). In many reports we get no more success from programs specifically directed to attitude change than from the general overall exposure to education. The few favorable changes observed by Jacob (1957), at the college level, were attributed, not to courses specifically concerned with attitude, but to the general stress on attitudes and values throughout the whole college community. And since Jacob made his report, specific studies (Greenberg and others, 1957) have supported his grim appraisal. Eglash (1957), after trying two different approaches to reduce opinionation in college students, found that neither had any observed effect.

But the results are not always grim, and not always one-sided. College courses in abnormal psychology have been reported (Coslin and Kerr, 1962) to bring about an improvement in attitudes toward mental hygiene policies. Courses in child psychology (Walters, 1959) report changes in the attitude toward child-rearing problems. Some favorable attitude change has been achieved by various films overtly preaching the importance of highway safety (Merrill, 1962). In these films, by the way, the more gory and frightening treatments were less effective. Perhaps when fear becomes too intense, the student tends to tune the program out, and in this way misses the message.

What conclusions can be drawn from this mixed pattern of results? First of all, success is precarious but not impossible. We cannot automatically expect great rewards, but neither are we automatically foredoomed to failure. We can expect more success in dealing with more academic attitudes (superstitious beliefs) than in tasks that call for a change of feelings or loyalties (liking for some other group). The changes that do occur are often attributed more to the general pervading atmosphere of the school than to any specific course. Sudden immersion into a vigorous college life may bring pronounced change in some attitudes during the freshman year.

Contending with Social Ills

The approaches discussed so far can be used to promote desirable qualities in the field of socialization. Through modeling and the development of moral understanding, and the intelligent use of reinforcement, for instance, we can hope to develop respect for the rights of others, cooperative and altruistic behavior, and a genuine feeling of compassion. The procedures for developing these qualities have been discussed in Chapter 12, and many of these procedures are available to the school as well as to society at large.

Along with its responsibility for developing the kinds of *prosocial* behavior mentioned above, the school has been concerned with the more worrisome social problems. As so often happens, a serious malfunction attracts more attention than the quiet progress toward a desirable goal. In this section we turn to the school's efforts to combat the social problems of prejudice and delinquency.

Attempts To Reduce Prejudice

The belief system, obviously, is intimately involved in prejudice and, as we have seen, may play the key role. Superficially, however, prejudice seems to go beyond mere belief. It involves likes and dislikes. It also involves dispositions or tendencies to approach or avoid, to attack or to help, to slander or extol. At any rate, in its attempts to reduce prejudice the school has gone beyond the problem of modifying the belief system (see above) and has made direct efforts to induce greater liking for other groups, and to discourage the tendency to cruel and discriminating treatment.

The Correlates of Prejudice Whatever the basic forces underlying its development, we find a number of characteristics that are frequently associated with marked prejudice. On the average, the highly prejudiced person is not happy when called upon to make systematic use of abstractions. He prefers to deal with the concrete. Often, but not always, the bigot has somewhat inferior intelligence and less than average education. Antiblack feeling is especially marked in the less favored economic groups, although, in some regions, students from wealthy homes (Young and others, 1960) also display marked prejudice. The more vicious kinds of beliefs are also more prevalent among the less educated

Attending to the Achievements of One's Own Group

The students in this investigation were in grade ten in a large high school in Ohio. To get three comparable groups, a Negro student was first chosen. A search was then made for a Jewish student of the same sex, age, and intelligence and for a comparable white, non-Jewish student. The procedure was repeated until there were 16 such trios, making three groups of 16 students each.

All 48 students studied an account of contributions made to American culture. The contributions of Negroes, Jews, and of white Gentiles were all stressed. Prior to the study of this material, the students were given a pretest dealing with the achievements of each of the three groups. The same test was given after the period of study, and again after a lapse of three weeks. The results show, first, how much the students gained after reading the material, and, second, what percentage of the material they retained over a period of 3 weeks.

AMOUNT THAT EACH GROUP LEARNED (AND REMEMBERED) ABOUT EACH TOPIC. (The first number under each topic gives the amount learned after one reading. The second number, in parentheses, gives the percent retained after a lapse of three weeks.)

	Topics		
Groups	*Achievements of White, Gentiles*	*Achievements of Jews*	*Achievements of Negroes*
White, Gentile Students	6.1 (57%)	7.9 (54%)	7.8 (46%)
Jewish Students	4.4 (21%)	6.1 (58%)	4.3 (51%)
Negro Students	3.5 (31%)	5.8 (59%)	9.7 (68%)

SOURCE: Lucille Gustafson, Relationship between ethnic group membership and the retention of selected facts pertaining to American history and culture, *Journal of Educational Sociology*, 1957, 31, 49–56.

groups, but many kinds of aversions and hesitations are equally prominent in the ranks of the better educated (Caffrey and Jones, 1969). Severe prejudice is more marked in rural than in urban areas (Lehmann, 1962). If antiblack feelings predominate in the community, the sexes share these attitudes equally (Young and others, 1960). When there is only moderate antiblack feeling, however, it is more likely to be found in males (Lehmann, 1962). In southern communities, women are likely to become less ethnocentric as they go through college. Men in the same communities, on the contrary, may become more ethnocentric with college. In general, the more prejudiced students come from overcontrolling homes. Their parents are more likely to feel inadequate, and these parents use their own parents as models to be followed. The prejudiced students feel sorry for themselves and consider that life has not given them an even break.

The factors that are typical of the students with marked antiblack feeling also hold for the students who have little interest in world problems in general. Here again we find less interest on the part of students from rural, southern backgrounds (Garrison, 1961).

Race Awareness and Race Preference To be prejudiced, in our sense of the term, the child must be aware of group differences. Race awareness, particularly, develops quite early. By the age of three or four most children will spontaneously sort pictures or dolls according to skin color. In many settings, they will often mention race differences when speaking of themselves or other people. This awareness is particularly true for children in minority groups, and in communities where issues of race have been important (Proshansky, 1966). This early awareness becomes much more pronounced as the child grows older.

In most people we find a tendency to exalt one's own group and to disparage the other fellow. We dwell lovingly on the achievements of the home team and enjoy the other fellow's discomfiture. Such chauvinism in moderate doses is a far cry from prejudice, but prejudice often does involve a tendency to magnify the achievements of the group with which we identify, and this less vicious facet of prejudice is often observed in schoolchildren (Gustafson, 1957).

In the dominant group, racial or ethnic preference follows hard on the heels of racial awareness. White children, in choosing dolls or pictures, quickly show a preference for dolls having conspicuous Caucasian features. Until recently, however, the black children also showed a preference for white dolls, suggesting that preference is determined, not by group membership, but by the dominance or prestige of the group.

With desegregation of schools, and with the vigorous championing of black culture ("black is beautiful"), things may be changing. White children in grades one to three still prefer all-white classes—whatever their experience with segregation. Black children in grade one are indifferent. Black children in grade three, however, choose all-black classes (Koslin and others, 1969). In one study (Hoetker and Siegel, 1970) high school students had seen several plays in which roles were assigned to black and white actors without regard to race. When asked to choose actors for a new play, white students made no racial distinction, but black students voted most often for black actors. Recent studies of doll preferences of young children show mixed results. Black preference for white dolls has not vanished, but is much less conspicuous.

The Effect of Group Contacts There has been a widespread hope that if groups would only get to know each other better, they would develop more liking for each other. To a certain extent this has been true (Amir, 1969). This is especially likely to happen when members of the majority group associate with higher-status members of the minority group, and when the members of both groups work closely together on some project or task which is more important than the narrower goals of either group. This might occur over a brief time when both groups are combating a flood, or, over a longer time when both are dealing with a serious drug problem. In such activities, however, it is important that the groups meet as equals. We should not have a white man acting as boss, and a black man carrying out his orders. With luck the school may succeed in having the groups meet as equals. In the school, moreover, there is, or certainly should be, an expectation that members of all groups should get along with each other, and this authoritative expectation also helps. Finally, the school goes beyond the casual interchanges, which prevail in some situations, and provides for sustained and close contacts. This also makes for greater success. Thinking of the general principles of learning, we would expect that harmonious relations are more likely to develop when the contacts have been pleasant and rewarding. Such effects, of course, cannot be guaranteed in the school or in any other situation. In the school, more than in most situations, however, the powers that be can keep these objectives in mind, and can exert deliberate pressure in that direction. When school people have tried to manage school contacts in deliberate and elaborate programs, mixed results are reported (Trubowitz, 1969). Some pupils change in the desired direction; others do not. Perhaps the change may depend on the intelligence and academic proficiency of the child. Success may be more likely for preschool children than for those further advanced (Crooks, 1970).

Looking at all the factors that influence the outcome of contact between groups, we can see that such experiences may not always prove helpful. When prejudice is already intense and highly structured, close contact may make it worse. Such unfortunate results are more likely to occur when one group feels itself pitted against the other, or in competition with the other, and especially when either group comes to feel a reduction of prestige from the contacts. Unpleasant incidents, naturally enough, will reduce the likelihood of success. Highly unusual mannerisms, offensive to one group, will make for trouble. If the general school situation deteriorates from any cause (a bad year in sports, curtailment of privileges, loss of a popular teacher), the scapegoat phenomenon may appear, and either group may blame the other for the misfortune.

In view of all the complexities it is not surprising that the effects of racial desegregation have been exceedingly diverse or conflicting (Carithers, 1970). From the many investigations there are reports of both greater integration and greater cleavage. From integrated camp experiences (Proshansky, 1966) we also get reports of improvements and worsenings. There are also indications of piecemeal or compartmentalized effects. Members of the "other" group may become more highly valued as resourceful campers, but not as cabin mates, or as folk singers.

Multiethnic Readers and Racial Attitude

At the beginning of the February term, 68 white, middle-class children in grade two were given several individual interview-type tests (e.g., "Show me the doll you would like to play with") to determine their attitude toward black children. (There were no black children in the schools and fewer than 100 black people in the whole city.) During the following term half the students used a multiethnic reader in which some of the illustrations showed nonwhite characters assigned appropriate names. The other half used a standard reader identical in content except for illustrations and names. At the conclusion of the term all children were again given the attitude tests. Scores on the final test were adjusted to take account of differences in the initial test.

	Attitude Toward Black People	
Test Forms Used	*Multiethnic Readers Used*	*Regular Readers Used*
Clark Doll Test	1.4	0.4
"Show Me" Test	2.6	1.5
Categories (Which doll does not belong?)	4.4	3.4
Direct Comparison	51%	24%

All differences were significant.

The higher the score (or percentage) the more favorable the attitude toward black children.

SOURCE: John H. Litcher and David W. Johnson, Changes in attitudes toward Negroes of white elementary school students after use of multiethnic readers, *Journal of Educational Psychology*, 1969, 60(2), 148–152.

The Effect of the General Curriculum The school can provide contact between groups and can try to manage this contact so as to produce favorable results. The school also teaches, and the general things that it teaches seem to do something toward reducing prejudice even when no special efforts are made in this direction. With increased schooling, at least the cruder and cheaper ethnic stereotypes tend to fall off. Compared to relatively uneducated people, high school students are more likely to reject such ideas as "Jews are tricky" or "There are differences between white and Negro blood" (Stember, 1961). College students have still less patience with such notions. We must hasten to add, however, that general education does not regularly reduce all unflattering ideas about minority groups. College people are even more likely than those with less education to link Jews with communism. The college graduate is also just as doubtful about the basic intellect of Negroes. Nor do the educated express any greater desire for close contact with members of minority groups, although they do come out for absence of legal discrimination. We can depend on education, it would seem, to reduce notions that are an affront to the general intellect, but we cannot be sure that general education will induce a more tolerant attitude, or a warmer personal acceptance of minority groups (Proshansky, 1966).

The effect of education in reducing general prejudice probably varies tremendously from region to region, and from one student group to another. In one Texas study, already mentioned (Young and others, 1960), male college seniors actually exceeded male freshmen in antipathy toward Negroes. For women, however, the reverse was true. This sex difference in susceptibility to education is quite consistent. In general, women are more likely than men to become less prejudiced as they receive more education (Stember, 1961). This is true even in regions—San Jose, California—where both sexes with a college education show a general decrease in prejudice (Plant, 1958).

Deliberate Programs and Curricular Modification All kinds of modification—minor or drastic—have been introduced into the curriculum in the hope that some group attitudes may be changed. Some success has been reported when readers are merely changed to portray black as well as white children (Litcher and Johnson, 1969). Many schools have established special programs clearly directed to the reduction of prejudice and intolerance. These have met with varied success. An early summary by Mainer (1954) reported both successes and failures from a variety of studies. Many of these studies, unfortunately, were rather casually controlled and we cannot say for sure that even the successes came from the program itself.

Some of the special programs merely arrange for greater stress on the humanity, virtues, and achievements of the groups in question. These classes may be linked with regular lessons in history, geography, or literature (Hayes and Conklin, 1953). At times a simple, factual, neutral discussion has proved sufficient to improve the attitude of students (Miller and Biggs, 1958). In other studies, however, a simple, incidental discussion did little to bring about a real change in attitude. More dependable results were obtained when the lesson brought out vivid details in the lives of the group, thus presenting the members as ordinary people, with universal needs and concerns (Williams, H. M., 1961). It may also be necessary, at times, to point the moral in fairly explicit fashion. Kagan (1952) found that a clear portrayal of the achievements and humanity of a given group (Jews, in this instance) did little to change attitudes. To get a reduction in prejudice he had to introduce an overt discussion of the topic itself.

When we do preach we should preach forcefully. There is evidence, however, that we may expect some success when we do not attack prejudice head on but deal with it as a means to some other goal. In the ostensible, and proper, attempt to lead a person toward a more successful emotional adjustment, we might bring up questions of prejudice as one illustration. Or we might talk about prejudice as something that injures our image in other countries. People who are led to feel some need to reduce their prejudice often show some change in this direction (Proshansky, 1966).

Typically, one-shot approaches have been less successful than a sustained workshop. A single dramatic film, however, can often have pronounced effects. Many years ago Peterson and Thurstone (1933) showed that these highly charged motion pictures can bring about changes in attitude toward other nationalities. In these investigations the motion pictures were powerful dramas, telling a convincing story for its own sake. There was no conspicuous preaching or pointing of the moral. Films overtly discussing the importance of better black-white relations (Kraus, 1962) have also proved effective. The effect was most pronounced when both a white and a black commentator took part.

The Problem of Delinquency

We have seen (Chapter 13) that delinquency is no easy condition to cure. Many of the general systematic attacks have shown only modest success, if not outright failure. Remembering the general principles of learning, moreover, we might wonder if the school can reasonably expect to be more successful than the more general programs. Consider, for instance, the principle of maintaining a schedule of success (Chapter 6). The student tottering on the verge of delinquency will become more adequately socialized insofar as he can be led to make a succession of adequate reactions, and insofar as he can be reinforced for each of these adequate reactions. To do this we wish to maximize his chances for early success. We should put him in some environment where, by good luck or good management, he will, someday, behave better than he is behaving today. At this point he should be led to experience *genuine* reinforcement. It is an open question if the predelinquent feels a marked glow from the approval of the typical teacher. On the contrary, in order to survive, he has often had to write off that kind of approval as unimportant. All in all, it is quite possible that the school is not the environment in which the delinquent is most likely to achieve early success.

Impressed by these considerations, a number of people, (Burchill, 1962; Havighurst and Stiles, 1961) have urged that the school work closely with the general community, and that the potential delinquents be given much work experience. One project of this type (Ahlstrom and Havighurst, 1971) has come up with disappointing results, but the authors believe they can find leads for improvements in the future.

Behavior shaping and contingent reinforcement, as suggested earlier (Chapter 13), have proved to be promising techniques in the improvement of some detailed aspects of delinquent behavior. One interesting approach (Bailey,

School Approaches in Combating Juvenile Delinquency

This investigation dealt with two elementary schools from a low-income area in Washington, D.C. There were 1250 students and 43 teachers in the two schools.

The schools sent in 179 names of pupils who were behavior problems. The children were from all grades, kindergarten through grade six. The neighborhood was predominantly Negro. There were 34 white pupils (26 boys and 8 girls) and 145 Negro pupils (106 boys and 39 girls) in the group.

The Glueck Delinquency Scale was used to estimate the likelihood that each student would become a court case. Of the children considered unlikely to be delinquent, some 5 percent actually did come to have a court record within four years. Of those for whom delinquency was predicted, 30 percent came to have a court record.

The technical staff (psychologists, psychiatrists, social workers) studied the case of each child and made specific recommendations. Typically, these called for social work with child and family, or more intensive individual treatment such as psychotherapy or removal to a foster home. The technical staff worked out a treatment for each of the 179 children. To obtain a control group, however, the proposed treatment was deliberately withheld from 68 of these children (Untreated Group). For most of the children in the treated group the help consisted of interviews with a psychiatric social case worker. Each of the treated children averaged about a dozen such interviews, and his parents about a dozen more.

Four years after the beginning of the project, the investigators were able to locate 165 children for whom they could get dependable records.

	Treated Group	*Untreated Group*	*Combined*
Total Number of Children	108	57	165
Number with Court or Police Record	42	14	56
Percent with Court or Police Record	40.7	24.6	

The difference would be significant at the 10 percent level, but not at the 5 percent level.

SOURCE: C. D. Tait and E. F. Hodges, *Delinquents, Their Families, and the Community* (Springfield, Ill.: Charles C Thomas Publishing Company, 1962).

Wolf, and Phillips, 1970), called for close cooperation between the school and the home, or dormitory managers. The immediate reinforcement was a report card filled out by the teacher. To give significance to this symbolic reinforcement, the home then systematically allowed or refused certain privileges normally present in the home. There was some suggestion that this schedule could be changed to a program of partial reinforcement with little deterioration in behavior. Such a program, of course, calls for conscientious cooperation from the home or the dormitory supervisor. Often the predelinquent's home is not noteworthy for dependable behavior of this kind.

Success, Disappointments, and Hopes

Obviously the school has been more successful in some tasks than in others. As expected, it has accomplished many good things in the more academic aspects of socialization. As a result of general education, or more specific programs, students have abandoned wild superstitions and have rejected the more ridiculous beliefs about other races, or other groups. The school has contributed to moral understanding. Success in these areas has been quite frequent.

In one optimistic report from the English secondary schools (Himmelweit and Swift, 1969), there is some suggestion that the type of educational experience may affect the student's persistence in school, his expectations of occupational success and, indeed, his actual occupational success. School experience is held to outweigh the influence of the home in these areas.

In the face of encouraging results such as those just reported, it is too bad to have to raise nagging worries about causal sequences. In England it is a triumph to get into the Secondary Grammar School. Being assigned to a Secondary Modern School is often considered a near tragedy. The mere fact of being accepted or rejected may have much to do with morale and attitude, no matter what happens after selection. For some kinds of occupational success, moreover, attendance at the Grammar School is mandatory. Over and above these matters of selection and technical necessity, however, there is the encouraging possibility that even the less academic aspects of socialization will be promoted by attendance at a school which has distinctive programs, which elicits pride from the pupils and staff, and with which the student can feel some strong sense of identification.

In the more emotional aspects of attitude and behavior we must face considerable disappointment. With more and more exposure to education, it is true, our students quit telling outrageous falsehoods about other groups, but they do not always acquire more liking for these other groups. Our attempts to prevent delinquency by school-like approaches have had limited success.

In the face of this pattern of results, school people should be willing to consider both bold new ventures and the painstaking analysis of the educational mechanisms available to the school. We should try to get a precise view of the tools we now have or are likely to acquire. We might then decide whether those mechanisms of schooling can be modified to serve the more vital tasks of socialization, or whether such tasks call for more intimate cooperation with some agency already possessing more appropriate tools.

Summary

Along with its primary responsibility for academic matters, the school has much concern for moral development, and is called upon whenever there is a problem in the socialization of youth. In turning to these vital areas, the school should look carefully at its powers and limitations. Can the school accelerate the passage through moral stages? How is it handicapped by the powerful reinforcements applied outside the school setting? How much success can the school expect?

In promoting socialization, the teacher invokes dependency motivation and meets the child's need for affection and support. When this is lacking, negative reinforcement can encourage undesirable behavior. Whether he wishes or not, the teacher presents a model for imitation and, at times, may elicit identification. Male teachers may play an important role in the socialization of fatherless boys. Models from history and literature can be freely invoked, especially when the latter are successful and presented in admiring fashion.

The classroom should be a natural place for developing moral understanding (Piaget; Kohlberg). In this it is important not to try to push the child into stage four before he has mastered stage three. Students in stage three have been successfully taught by fellow students who have just reached stage four. Discussions should be supplemented by direct experience within the kinds of moral problems to be found in the school (e.g., cheating). These must involve genuine decisions. Reports of real-life incidents are also used. Direct moral exhortation may at least provide a model of someone who is not ashamed to speak of moral matters. In all this there is some danger of losing the cheerful spontaneity that accompanies much adult behavior.

Beliefs can be charged with feeling or may be relatively neutral. Attitudes involve feelings and disposition toward things, activities, or people. Prejudice means attitude toward people. Powerful attitudes or prejudices are an important part of the person, and a change involves a major readjustment. The dogmatic person will resist any alteration in an issue close to him. Having accepted a fact or supposition, he is reluctant to change. He relies heavily on authority and gives up one authority only to embrace another. Prejudice against people comes from the threats they suggest to his beliefs or authority figures. This can occur in either right-wing or left-wing groups.

In some attempts at persuasion, the teacher must work against an entrenched belief system. A particular view can best be altered if it can be somewhat separated from the more rigid parts of the system. By changing this one view we may modify the whole system and set up new reference points or adaptation levels. In other tasks of persuasion there can be more direct appeal to logic. The persuader is more effective if he carries prestige and gives the impression of being fair. Often it helps if he is seen to be one of the group. He should not hesitate to point the moral. A balanced presentation has advantages and disadvantages.

The school has had mixed success in teaching attitudes. In college some changes come in the early years. These may be due more to the general atmosphere than to specific courses, although the latter have been effective in changing highly unintellectual opinions.

At times the school turns its attention to social ills such as prejudice and delinquency. Prejudice often begins early in life and accompanies the early awareness of group differences. Some kinds of prejudice are linked to ignorance and restricted experience. Other kinds persist through college. Typically, the highly prejudiced are poorly adjusted in other ways. Prolonged association with members of other groups produces mixed results. Results are most favorable when people meet as equals and face some demanding task. Education, in general, reduces stupid stereotypes, but does not always eliminate antipathy. Some successes in the latter area have come from using multiethnic readers, from films, from prolonged discussion of the merits of different groups, and from making people feel ashamed of prejudice itself.

In combating delinquency the school is handicapped by the delinquent's pronounced aversion to school, and by his poor chance of encountering early reinforcement in school. Distaste for school is almost universal among delinquents. Behavior shaping may work if the reinforcement is linked to things that matter in the delinquent's life.

In reviewing its responsibilities in this area the school can see some successes, especially in the cognitive aspects of morality. It should also consider the possibility that the task of teaching morality may call for new approaches and for attitudes not always harmonious with the academic setting.

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15

The Class and Social Group

Suzanne Szasz

15

The Class as a Social Group

Like a group of passengers on an airliner, the class is a collection of individuals. And to some people, it is little more than that. To a number of teachers, for instance, the class may be regarded largely as an assemblage of individuals, each of whom must be taught. Obviously, however, the class is more than such an assemblage. It is also a social group, having a structure and an organization of forces which give it a measure of unity and coherence. To the members of the class, this group can be a very real thing. The group or class may have a character of its own, somewhat apart from the character of the individuals that make it up. Some of the assemblages in which you yourself take part may be lively, vigorous, and noisy. Other groupings, even when they contain many of the same people, may be more subdued and thoughtful.

The group as such may have a marked influence on its members. Over and above the individual likes and dislikes, the group itself may induce loyalties or aversions in different students. In extreme cases the individual may so lose himself in the group that he has a clearer picture of the doings and achievement of the whole team or gang than of the things that he himself has done. Under other circumstances the group, as a group, may be an object of hostility. In this latter situation the student's dislike is not especially directed to Bill or Sam, but to some vague, corporate "they." "They" are the monsters who are scheming to undo him. It is on "them" that his imagined revenge descends.

Since we always deal with some actual group, we have many opportunities to help the students develop skill in working with groups. Experience in such group work is inevitable. By a little guidance or care, we can make sure that the experience is useful. As a by-product, we may be able to use a few powerful group forces to accomplish other purposes, such as the development of desirable attitudes or the attainment of social maturity.

Characteristics of the Classroom Group

Groups have several characteristics in common. Something is expected to emerge from them, whether that something be mere fun or the preservation of a cherished landmark (Johnson, D. W., 1970). They also have some machinery, formal or informal, that enables the group to continue its existence for some time at least. Along with these common features, however, groups vary tremendously in goals, mechanics, and amount of structure.

Like the school board, or the neighborhood improvement association, the class is a working group. The students do not merely drift together out of sociability or mutual attraction. They assemble on call for a particular purpose or series of purposes. The class differs from many other working groups, however, in the length of time its members spend together and in the variety and unpredictability of the tasks undertaken. Few other committees meet together for several hours each day. And most working groups, apart from the classroom groups, are task oriented. They can clearly say, "This is (or is not) what we are here for." When the task is accomplished, the group can disband or adjourn. This is not true of the class. Here it is easier to predict the schedule and extent of meetings than the tasks to be taken on.

In this persistence of the group, irrespective of the tasks to be attempted, the class bears some resemblance to the family group. The members of the family are also unsure of the problems on which they will work from one day to the next, but they do know that the group will persist from day to day.

Although less task oriented than the typical committee, the classroom group is much more of a business group than is the typical childhood gang or adolescent crowd. In these more spontaneous groups, the members drift together out of mutual attraction or common interests, if not by sheer accident. Here it is chiefly important to be together. The activities taken on are largely incidental. But the class has some of the features of these more spontaneous groups. On occasion the entire class, or most of it, may turn into such a group. And almost inevitably, the class will include several smaller groups of the spontaneous type.

General Relations Between Students

Part of the group structure is made up of the individual attractions, aversions, fears, or disdain that each student holds for some of the others. Some of the attractions are mutual; others, one-sided. One student may have strong feelings of either liking or hostility for many classmates; others may feel indifferent to most. Some students are admired by most, rejected by some. Others are largely ignored or rejected.

Sociometric Descriptions

Patterns of attraction or repulsion are typically shown on a *sociogram,* of which there are many types. One of these, a *target sociogram* is shown in Figure 15.1. The students, identified by number, had been asked to indicate their first choice for a seating companion at a worktable to which pupils were to be assigned. Some were chosen frequently, others not at all. Those receiving most votes are placed toward the center of the target. Heavy lines join two pupils who have chosen each other. Actual rejections—people you don't want to sit beside—are shown by arrows. In this illustration boys have been placed on one side of the target and girls on the other, but it is not necessary to make this distinction between the sexes. Girl 12 and Boy 6 have received many votes. Girl 19 received few, if any, and is overtly rejected by many, including a fellow isolate. We see a few cliques. Boys 2, 3, 7, and 9 show mutual attraction and, with one exception, they reveal no mutual attraction with others. Some of them show rejection of others.

Dependability of Sociometric Results There has been much skepticism about the meaning we can attach to sociometric choices. They show what pupils write down on a particular day and what they write down for the teacher's eye. Do they reflect genuine persisting feeling which might be expected to show up in actual behavior?

For young children, especially, photographs of classmates will help in the process of determining preferences. When allowed to look at individual photographs in a viewer, each child will spend more time in looking at some children than at others, and these viewing times, as a matter of fact, will in themselves provide a fair index of liking (Lott and Lott, 1970). When pictures are merely used in conjunction with regular sociometric choices, moreover, they add to the dependability of the ratings. Choices made in this way may reveal preferences

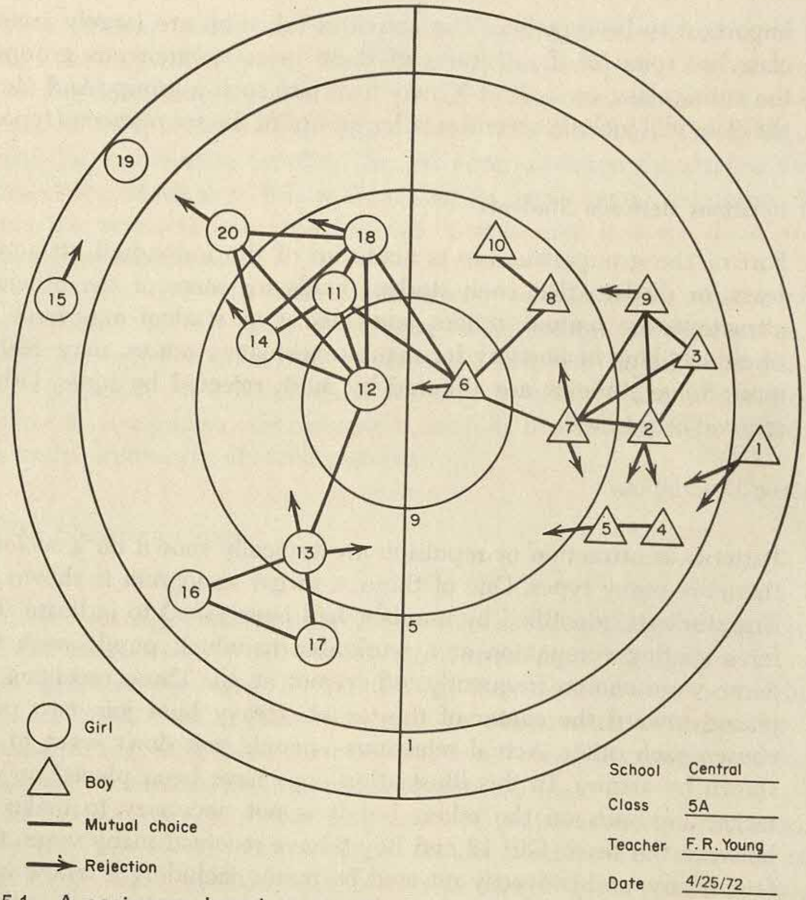

Figure 15.1. A sociogram based on twenty pupils. Redrawn from N. E. Gronlund, *Sociometry in the Classroom* (New York: Harper & Row, Publishers, Inc., 1959), p. 73, Figure 3.

that will continue for five months or so, even during the nursery school period (Hartup, 1970). For children of any age, the choices will be more consistent and meaningful if the student selects people as companions for familiar activities (for a play group as opposed to an hypothetical ocean voyage); for persisting activities (play group as opposed to going to a particular movie); and for activities that call for intimate association (seating companion as opposed to delegate to student council). Things are also better when the teacher has a good reason for requesting choices and when there is a reasonable hope that such choices will be honored.

Under favorable conditions sociometric choices seem to mean something. As we have seen, they often show a fair amount of constancy or persistence. With respect to popularity, moreover, the choices made by one random half of the class are quite similar to those made by the other half (Marshall, 1958). Finally, spontaneous groupings, when observed, tend to confirm the sociometric choices.

Indirect Measures of Liking for Classmates

One group of 7 girls and 4 boys, aged 6 to 12, had been meeting as a group for several weeks in a summer camp setting. A second group of 6 girls and 3 boys, aged 13 to 16, had also been meeting together for the same period.

Looking Box: A child was shown his fellow camper in a slide viewer. By pressing a button when the light went out, he could keep any picture in view as long as he wished. Score is in terms of button presses.

Treasure Hunt: Each child was shown a number of small boxes, each covered by a photograph of a fellow camper. The child was told that a quarter was under one of the boxes. To get the quarter he should lift one box after another. He was allowed five choices.

Liking Scale: Each child rated all the others on a scale of liking from 15 (most liked) to 1.

Degree of Liking Expressed by Fellow Campers:	*Average Number of Button Presses To Bring Picture Back*
11–15	4.0 seconds
6–10	3.5
1–5	3.7

The value 4.0 differs significantly from the others.

Treasure Hunt:	*Average Degree of Liking for Fellow Camper Pictured on Box*
Boxes chosen first or second	12.7
Boxes chosen fourth or fifth	10.9

The difference is significant.

SOURCE: Albert J. Lott, and Bernice E. Lott, Some indirect measures of interpersonal attraction among children. *Journal of Educational Psychology,* 1970, 61(2), 124–135.

Popularity

The distribution of popularity is something like that for income. As with income, we find a very few people in any group who are exceedingly popular. Trailing well behind these favored few, we find the vast bulk of the "also rans" who pick up one or two votes each. At the last, of course, are the few isolates—the 10 or 20 percent who receive no votes whatever. As with income, most of us pile up much closer to the lower limit of popularity than to the upper limit.

At times, of course, the child who receives no votes may also be actively rejected. Number 19 in Figure 15.1 is in this category. She received no votes and is actively rejected by four of the girls. But isolation and rejection do not always go together. Many isolated pupils, numbers 1 and 15, for instance, are not rejected in any way. They just don't count. Conversely, rejection does not always mean lack of choices. A pupil chosen by many pupils could be rejected by many others. In Figure 15.1 you will notice that the most popular girl is rejected by the most popular boy. Number 8 is one of the most popular boys, as far as choices are concerned, but he is rejected by two other boys. Number 5 exceeds many pupils in number of choices received, but he is rejected by three other boys and by one girl.

Characteristics of Popular Students Students frequently preferred are likely to be somewhat above average in intelligence. The bright child is much more likely to be chosen than the child of average intelligence (Hartup, 1970; Dentler and Mackler, 1962). The extremely dull child certainly is seldom selected. Even in a special class for the mentally deficient, the duller children within this group will be neglected. As we might expect, intelligence is even more important in mutual choices. Friends choosing each other tend to be fairly close in intelligence.

In school achievement, as in intelligence, the low-scoring student or the student headed for failure is unlikely to be selected. Students with average achievement, however, are as likely to be popular as those with superior achievement. Indeed, in many cases, the average student may be somewhat more popular than the top-scoring student.

The popular student has better-than-average personal appearance and certainly tends to be free from marked physical handicap (Richardson and Royce, 1968). He is also somewhat better adjusted emotionally. He shows less babyish clinging dependence on adults (McCandless and others, 1961), but does not hesitate to ask for necessary help from peers or suitable adults (Hartup, 1970).

Self-esteem goes with popularity and the more frequently chosen students have a higher self-concept (Guardo, 1969). Older students who are frequently chosen usually have high aspirations for themselves and impress others as possessing a quiet self-confidence. The popular students are described by those choosing them as being genial, outgoing, honest, fair, loyal, and sincere.

As might be expected, the popular student is the one with social interests, interest in other people, and, among older students, interest in members of the opposite sex. Those who are seldom chosen often have strong interests in hobbies that can be pursued in solitude. Students are less likely to choose the girl who has pronounced interests in music, art, or literature, or the boy who is especially fond of his workbench or laboratory.

The excessively talkative student faces the risk of being rejected. In the second grade, the most popular children are those making few, but mature, statements (Rosenthal, 1957). Older students are likely to apply such labels as noisy, conceited, "pesky," to those they reject (Feinberg and others, 1958). These labels suggest the person who forces his opinions on others, or who consistently intrudes himself into all conversations. When older students speak of the popular person as being quiet, they may well mean freedom from this intrusiveness.

Aggression and Popularity

The subjects in this investigation came from three schools, grades five and six in a white, upper-lower-class district in a New England city. Each pupil was asked to "list the three *boys* in your class that you would like to have for your best friends," and also to "list the three boys in your class that you wish were not in your class at all." Notice that only boys were to be chosen, but both boys and girls were asked to choose. A *popularity score* was obtained for each boy by subtracting the number of rejecting votes he received from the number of times he was nominated as a friend.

Each pupil then filled in a "guess who" booklet. He was told that in the booklet there were "some word pictures of boys in your class. Read each one and write down the names of the boys whom you think the picture fits." Pupils were told that they could write more than one name for any picture, and that they could use the same name for any number of pictures. They were also assured that the teacher would not see what they wrote. A boy's score for the different kinds of aggression consisted of the number of times his name was mentioned by the boys and girls in his class. Popularity and aggression scores were obtained for a total of 74 boys ranging in age from 10 to 13.

Type of Aggression	*Typical Description*	*Correlation with Popularity*
Provoked Physical	"Here is a boy who will always fight back if you hit him first."	.31
Outburst	"This boy gets very, very mad at times."	—.21
Unprovoked Physical	"This boy starts a fight over nothing."	—.36
Verbal	"This boy often threatens other boys."	—.45
Indirect	"Here is a boy who breaks things that belong to others."	—.69

SOURCE: G. S. Lesser, The relationship between various forms of aggression and popularity among lower class children, *Journal of Educational Psychology*, 1959, **50**, 20–25.

Middle-class boys, in describing their friends, specifically note that they mind their own business.

But quietness, for all its importance, is not enough. True, the quiet, modest student is not likely to be rejected. But neither is he likely to be chosen. He may merely be ignored. The popular second-graders are not those who make no statements. They are those who make few but mature statements. Popular students in grades four to nine tend to participate in class (Ahlbrand and Hudgins, 1970). At the high school level, the popular students are sometimes described as being quiet, and at other times as being good conversationalists. Upper-income groups also stress social participation and capacity for leadership in those they select.

Home background plays a varying part. The parents of the popular student are likely to be outgoing, interested in sports, socially active themselves, and glad to welcome friends of their children into the home. Children from broken homes, however, do not seem to lose out in popularity (Barr and Hoover, 1957). The importance of income or class is harder to determine. Mutual choices are likely to fall within social class or income group. There may be some circumstances in which high SES children get more votes in general, but this tendency is by no means clear-cut. There is some suggestion, moreover, that the popularity comes, not from parental income itself, but from the relaxed confidence such students may exhibit in their actual classroom behavior (Glidewell and others, 1966).

Dependency and Popularity

This study took place in a Hawaiian nursery school and involved a total of 23 boys and 32 girls between the ages of 3 and 5. One of the most revealing measures of popularity was that of "free-play" choices. During free-play periods each child was observed for a period of time and his four most frequent playmates were listed. These lists were used to establish popularity. If Joe turned up as one of the most frequent playmates of Bill, of Sue, and of Ann, he would get a score of 3. If Terry was on the most-frequent-playmate list of 9 other children, he would receive a score of 9.

To get measures of dependency, each child was observed for 15 periods of 5 minutes each. During this period all adult contacts were noted. Such contacts included asking for help in a physical problem, bids for attention, and bids for emotional support. To a considerable extent ($r = -.33$) the child making most bids for emotional support turned out to be the least popular. For girls, there was a similar relation ($r = -.38$) between *total* number of adult contacts and lack of popularity. For boys this relation was not so pronounced ($r = -.18$).

SOURCE: B. R. McCandless, Carolyn B. Bilous, and Hannah L. Bennett, Peer popularity and dependence on adults in preschool-age socialization, *Child Development*, 1961, 32, 511–518.

The newcomer to the district is at a disadvantage (Glidewell and others, 1966), and as far as actual associations are concerned there is a tendency to choose neighbors and close acquaintances. When merely indicating preferences, however, older students are not greatly affected by proximity. In selecting desired friends, as a matter of fact, high school students may choose people whom they know only by sight (Scandrette, 1958).

Mutual Choices and Friendships

The student's popularity could rest on choices he receives from people he admires or from those he ignores. In elementary school, as a matter of fact, only a small fraction of all the choices is likely to be reciprocated. As children grow older, however, the proportion of mutual choices increases, and in the secondary schools, a fair number of each student's choices go to those who also select him. This tendency, more prominent in girls than in boys, is probably an aspect of social maturity. As you get older, you are more likely to choose people whom you can get along with or who will respond to your advances.

It is probable that few mutual choices reach the stage of the most intense friendships. It is significant that, even in high school, relatively few mutual choices are of boy-girl type, whereas the most intense attractions are obviously of this type.

Boys, by the way, distinguish rather clearly between friends, on the one hand, and romantic attachments, on the other. When asked to describe an ideal *friend*, older boys, like younger boys, tend to describe another boy of about the same age. The older girl, however, unlike her younger sister, will picture her ideal friend as a boy somewhat older than herself. For older boys, it appears, there are friends and there is also a sweetheart. For older girls, on the other hand, there is a sweetheart and whatever else is necessary to fill in the details of life.

Close friends of the same sex tend to come from the same district and very often from similar socioeconomic groups. Friendships are most frequent within the same race and age groups. Mental age may be even more important than chronological age. Friends tend also to be comparable in physical vigor. As we might expect, interests are similar.

The qualities desired in friends turn out to be similar to those which make for popularity. Indeed, popularity itself is one of the traits often cherished in friends. Younger and older children look for different things in their friends (Horrocks, 1954). Children in the second grade stress physical appearance and home conditions. By the sixth grade, however, these factors become less important and the chief stress is on cheerfulness, enthusiasm, friendliness, and popularity. At the high school level, friendliness and popularity are still important in choosing a friend of the same sex. High school students, planning on college, ask that their friends be good talkers, talented, and serious, whereas those not planning on college stress the good listener, the athlete, the lively practical joker who also meets the current standards of dress, and who is generally personable.

In choosing friends of the opposite sex, older students profess to be affected by a number of standards. Good manners stand high in the list for both sexes. Ability to converse and to dance is also listed frequently by both boys and girls. Boys want their girl friends to be considerate and, especially, to keep their tastes in entertainment within moderate financial limits. Girls are anxious that their escorts shall make a good impression with other people. Personality also comes high in both lists and, like all the rest of the traits mentioned, is more important than good looks or physique. Humor is mentioned favorably, but far down the list.

Perception of the Classroom Structure

To a considerable extent, students are aware of the pattern of likes and dislikes within the class. Obviously we find great differences in this social perception. Some students have a very clear picture, whereas others have a rather vague notion. Older students have clearer ideas of these matters than younger students, partly, perhaps, because mutual choices are more clearly established and more clearly recognized among older children. At almost all ages there is more success in estimating the popularity of others than in estimating one's own status, although toward the end of high school, students may become surprisingly accurate in discerning their own popularity. Each student is more successful in detecting his general status than in knowing just who voted for him and who did not. Awareness of these matters, sometimes called *social empathy,* may play a part in successful leadership.

Dealing with Classroom Relations

The relations that develop between classmates have obvious importance. Friendships are precious in their own right. The prospect of moving away from friends can bring near tragedy to many children. For children experiencing little parental support, a rich friendship pattern can do much to make good this deficit (Hartup, 1970).

The Broader Implications In observing a child's relation to his fellows, we can get hints of his standing in other areas. Not all rejected children, of course, turn out to be delinquents or dropouts. To a great extent, however, the dropout and the delinquent have a history of neglect or rejection. When coupled with other difficulties, such a pattern of rejection could alert us to the special problems that might arise.

As with the delinquent and the dropout, we must not overstate the relation between mental ill health and lack of acceptance. We must not assume that mental health is possible only for the vigorous extrovert, or the social butterfly

(Ausubel, 1965). Many a pupil, well equipped with inner resources, may be quite happy and well adjusted as he quietly develops his own concerns with only moderate interest in his standing with other students. On the other hand, there are many students who do have a powerful need to be noticed and accepted, and when this does not follow from normal behavior they may be driven to ridiculous or unwholesome actions. When these fail, as they so often do, the frustration may reach serious levels. Whether or not rejection or indifference actually induces mental ill health, moreover, that rejection may be a symptom of some difficulty. Children, consciously or unconsciously, tend to avoid those having some types of emotional trouble.

Whichever comes first in the circular pattern, acceptance and popularity do go hand in hand with other fortunate conditions (Hartup, 1970). A middle-class child, belonging to the dominant cultural group, free from conspicuous physical defects, is likely to be popular and also to do well in school. Doing well in school—up to a point at least—increases his popularity. Since he has no need to expend exceptional effort in establishing himself with his fellows, moreover, he is more free to think about academic matters.

In suggesting that moderate popularity actually promotes academic performance, we are unfortunately still in the realm of conjecture. When applied to the extreme case, however, the conjecture is fairly plausible. The student tremendously disturbed by the indifference of his fellows may easily become morose, apathetic, or desperate to the detriment of his development in many areas.

Helping the Isolated Pupil For some students isolation or rejection is a tragedy. For others it may be a serious problem, and may interfere with their well-being in other areas. Whenever possible, we might take any steps open to us to try to correct this difficulty.

Thinking of the general principles of learning, we would try to maximize the chances of early success. From among the whole class, try to find a few who show the least aversion to the isolate. Form an occasional group, small in size, made up of the isolate and the more promising classmates. Set them to work on a task in which the isolate has some hope of modest success. If you can thus engineer some early social reinforcement, you may change the isolate's own attitude toward the other students (Hartup, 1970). Success often breeds success, and popularity, popularity. Finding a measure of acceptance, the isolated student may throw off some of the defenses that made him unpopular.

Moderate acceptance or praise by the teacher may help (Flanders and Havumaki, 1960). Establishing the isolate as teacher's pet, of course, would not help him. But you can try to show him the same respect and friendly warmth as you show to all the other pupils. Admittedly, this advice is often easier to give than to follow. If you are honest with yourself, you may find some rejected children very difficult to like. But you can try. It may help to realize that often the unattractive traits come, not from malice or meanness, but from insecurity and the rejection already experienced.

Helping Children To Become Popular

Children in an Australian orphanage, aged 5 to 13, were given a battery of personality tests and a test of sociometric status. From a total of 52 children, 9 pairs were matched on age, sex, residence in the orphanage, general adjustment, and sociometric status. One member of each pair was then assigned to a play therapy group and the other member to a control group. The children in the control group were left on their own while the experimental children received play therapy. In the play therapy, the experimental children were encouraged to play freely with dolls and other objects representing their usual experiences. These were chosen to suggest many types of problems and to involve many aspects of personality.

The play therapy continued for 27 weeks. For both groups, the tests and the sociograms were repeated after 12 weeks and after 27 weeks.

	Number of Each Group Showing Improvement in Sociometric Status	
	After 12 weeks	*After 27 weeks*
Play Therapy Group	6	4
Control Group	0	0

SOURCE: F. N. Cox, Sociometric status and individual adjustment before and after play therapy, *Journal of Abnormal and Social Psychology*, 1953, 48, 354–356.

You might try to see if the rejected child has some skill or hobby that may place him in a more favorable light. Then try to arrange some project in which this skill or hobby would show up in a natural way. You might assign him some routine job in which he had a reasonable chance of success, and in which he might show up as a more acceptable sort of person.

Beyond these safe and obvious steps, you can, if you feel enough confidence, try more radical and more risky treatment. Some teachers attempt to discuss the problem in some detail with the child himself or with his parents. Others have tried to talk to the other students either about the general problem of tolerance or even about this particular student. If you are skillful in these matters, you may decide to encourage a group discussion of popularity and its aspects. With luck and good management this may ventilate some of the unacknowledged fears and worries that lead pupils to reject others. Susie may come to realize that she dislikes Bill, partly because something about him makes her think of aspects of her own home life that she would prefer to forget. This is high-powered medicine, however, and you should feel no obligation to try it unless you have considerable confidence that you and your group can avoid the obvious dangers. You may find a mock drama somewhat less risky. Here the students, acting in make-believe manner, may freely take one role or another and may be encouraged to act out the difference between behavior that makes for popularity and that which leads to rejection. But even here there is some risk. You may be unearthing strong emotions that may prove tremendously disturbing to some of the students.

Authority and the Pattern of Influence

In any group that meets fairly frequently we are likely to find a definite power structure. This means that some people within the group will be very influential. Others will play a minor role. This power structure can be observed by several procedures (Flanders, 1960b). Often each member of the group could tell you which other members influence him and which other members he might expect to influence. With young children we often find fair agreement in these matters. If Jim says he can influence Bill, then Bill is likely to name Jim as one of the people who influences him (Gold, 1958).

In addition to this rather direct approach there are many other types of analyses, some of them exceedingly complex and technical (Glanzer and Glaser, 1959, 1961). Who does most of the talking? To whom do most people talk? Do most people remain silent until one particular person has spoken? After that who follows suit? and in what order?

Patterns of Authority

Observations reveal a variety of patterns. Theoretically the influence could be distributed perfectly evenly. If there are 20 people, each could do precisely one-twentieth of the talking. Most people, in talking, might address their remarks to the entire group, not singling out any one member in particular. Or if anyone is singled out, this would not always be the same person. Perhaps, for instance, remarks would always be addressed to the person who has just spoken. Such an even distribution, however, would be most unusual. Ordinarily we would find that some people do more than their share of talking, that most remarks, in turn, are addressed to a few people, perhaps to one person, and that there are some fairly frequent sequences, Bill making a statement and Jim and Sam fairly regularly following suit (Gibb, 1960). For young children these power relations remain fairly constant from month to month (Gellert, 1961).

The unevenness in the distribution of influence could take several forms. We might find a very simple structure made up of one leader and a group of followers, no one of the latter having any more influence than any other. Or we might find several people each of whom exercises considerable influence over his own subgroup. In all this we may find that the pattern remains fairly constant from time to time, and from one activity to another. Or we may find that the pattern changes with the topic under discussion, or with the project being planned.

The Teacher's Place in the Pattern

Even if he did nothing about it, the teacher's age, size, and legal status would point to him as a key figure in the power structure. Very often he does the talking. Pupils, when they speak, typically address their remarks to the teacher. When they do speak to each other, their eyes are often on the teacher (Adams and Biddle, 1970). Many people, impressed by the talk about democratic practices, are somewhat surprised by the marked concentration of influence in the person of the teacher. But some degree of concentration seems inevitable and desirable. After all, the teacher should have more to contribute and should have a surer sense of the direction the class should be taking (Flanders, 1960a).

The teacher can never forget his very real legal and moral responsibilities to the adult community (Ladd, 1958). Unlike the secretary of the local improvement association, for example, the teacher cannot take the attitude that he is merely to help the group carry out its wishes. He is legally entrusted by some agency to accomplish a set of fairly definite objectives. He is also given enough authority to permit him to carry out his assignment. He can delegate much of his authority if he so chooses. But he cannot actually relinquish either the authority or the responsibility.

The responsible role assigned to the teacher by law and by social expectation fits in with the influential role that many teachers automatically adopt (see above). This extensive influence, however, is somewhat at odds with the more democratic role which is advocated by many theorists and to which many teachers profess allegiance. At the very best, these discrepancies may make for conflict and confusion. When the conflict is between ideals, on the one hand, and classroom exigencies, on the other, the problem may be quite disturbing.

Whenever the teacher's inclinations and the practical circumstances permit, there are some gains to be had from a moderate dispersal of authority. Glidewell and his colleagues (1966) hold that such diffusion of authority or influence among pupils themselves is associated with greater independence, greater flexibility in thinking processes, less anxiety, and a greater feeling of moral responsibility. Naturally, such a dispersion also involves more direct interaction between pupil and pupil. This is likely to have an effect, one way or the other, on the feelings pupils have for each other.

Classroom Climate

Many people, impressed with the fact that the class is a group rather than a collection of individuals, have stressed the general group climate within the class (Withall and Lewis, 1963). Does the teacher permit some diffusion of authority, for instance, or is all the authority tightly concentrated in his hands? Does the group take any part in setting the goals? To what extent can we see group forces in operation?

The Group-Centered Approach

Under a genuine *group-centered* approach, the teacher delegates much responsibility to the class and relies on group forces—which include his own efforts—to achieve useful outcomes. True enough, the teacher has more than just one vote in this process. It is his responsibility to describe the general task facing the group. In most cases he supplies a fair amount of information, especially of a technical sort. He also makes sure that the group knows the external conditions under which it works—number of hours available, examinations to be taken, papers to be submitted. Over and above such mechanical matters, he often helps formulate an issue that he thinks is present but not clearly defined. At times he may try to keep the group oriented toward the problem at hand. At other times he may permit a new problem to replace the old. On still other occasions, suspecting that the issue under discussion is gradually changing, he may get the group to consider whether it would be better to return to the old issue or to formulate the issue that appears to be taking over. Often he feels obligated to get the group to bring to the surface some troublesome but important question that they seem reluctant to face.

Seeing how much responsibility the teacher retains, we might wonder what is left to the group. First of all, within the limits that must be set, the group assumes considerable responsibility for setting the specific goals and the tasks on which they will work. After the goals have been set and the work is under way, the teacher may often make more than his share of comments and suggestions, but in some cases, the teacher might be indistinguishable from the students were it not for the fact that he is older and usually larger (Flanders, 1960a).

According to the proponents of the group-centered approach, it is not enough that the teacher encourage the group to take as much responsibility as possible in making the major decisions. He must also provide emotional support for the students (Gibb, 1960). He should accept each suggestion seriously, making liberal use of praise and encouragement. He may ask questions to be sure that the suggestion is completely understood or that it really contains what is in the student's mind. He does not use questions to bring out deficiencies or limitations in the suggestion. Scolding, sarcasm, or disparaging statements would be completely out of order. And, naturally, the spirit of the group process would be nullified if the teacher had to call attention to his own status or authority, or if he had to act defensively, or to show that a certain suggestion is just what he had been trying to advocate all along.

Effect on Group Relations Although there are some exceptions (Tizard, 1953), the general trend of the early evidence (Benne and Levit, 1953) has suggested improved group relations associated with the group-centered approach. There seems to be more *group cohesion*. This is shown by the fact that pupils readily accept group decisions as their own and feel a personal responsibility to carry out the wishes of the group. When some job must be done, almost anyone handy is likely to do it. You can be sure that someone will do what is necessary, but ordinarily you cannot predict just who will do it (Gibb, 1960). In such a situation the group needs are paramount and there is little fear of being criticized for taking too much on one's self.

As one aspect of group cohesion, the early experiments in this area reported a marked reduction in scapegoating. With the group-centered approach, pupils were less likely to pick on one unfortunate member of the group and subject him to harassment and teasing (White and Lippitt, 1960).

Under a highly autocratic arrangement, classwork may disintegrate if the teacher should leave the room. The early experiments clearly showed much less dependence on the teacher with group-centered teaching (White and Lippitt, 1960). Pupils working under this approach went about their business in relaxed but purposeful fashion whether or not the teacher was in the room.

For the most part, students who have had experience with group approaches tend to like working in groups, and to approve many features of the group-centered class. You should not take this matter for granted, however. Upon their first exposure to group-centered methods, many students will feel bewildered and critical of the lack of direction. Adults often continue to resent the lack of positive leadership (Kelley and Thibaut, 1954; Sears and Hilgard, 1964). Some college students, probably those who will do the best work academically, will simply ignore the democratic features of the group approach and go blithely about the business of getting good grades (Johnson and Smith, 1953). From one elaborate experiment (Watson, 1953) we must conclude that it is extremely difficult to decide just who will appreciate group work. In this study it was the student unusually concerned about fears and anxieties who seemed to prefer the group approach. Dislike for group-centered teaching, by the way, is by no means a symptom of an authoritarian personality. It is often the thoroughgoing liberal who places a low value on such group-centered work. Such students stress the frequent lack of intellectual stimulation. Other students have been put off by the suspicion that the teacher is using this approach to hide his own lack of knowledge in the field. They suspect that he finds it easier merely to call on other students than to prepare the material himself. In some instances, of course, their suspicions might be right. On the whole, however, the really conscientious use of the group-centered approach may be more arduous than the sheer presentation of subject matter.

Mastery of Subject Matter Offhand it would seem obvious that there would be higher achievement when pupils were working in a "happy" classroom and were working toward goals of their own choosing rather than conforming to goals imposed from above. Unfortunately, however, this has not proved to be the

The Group-Centered Approach: One Thing or Several?

A questionnaire regarding the practices and attitudes of their instructors was given to 201 college students taught by 9 different instructors. The questionnaire contained 30 items often used to distinguish the group-centered approach from the teacher-centered approach. The results were then subjected to factor analysis to see if the different items seemed to be getting at the same thing or different things. Some 20 of the items seemed to form four separate clusters, the other 10 did not seem to have any coherence. The 20 items were arranged in a new questionnaire and given to 425 different students taught by 14 instructors. The same four factors emerged.

	The Correlation Between Separate Aspects (Factors) of the Group-centered Approach			
	I	*II*	*III*	*IV*
Factor				
I Extent to which students took part in class		.32	−.27	.14
II Extent to which teacher invited or encouraged student participation			−.30	.29
III Surly or hostile attitude of the teacher				.01
IV Extent to which teacher determined objectives and procedures				

SOURCE: Frank Costin, Empirical test of the "teacher-centered" versus "student-centered" dichotomy, *Journal of Educational Psychology,* 1971, 62(5), 410–412.

case. From a large number of comparisons (Sears and Hilgard, 1964; Stern, 1963; Anderson, R. C., 1959) it appears that achievement is just about the same in group-centered and teacher-centered classes. If anything, there has been a slight advantage for the teacher-centered approach (see Coop and Brown, 1970), but in general the difference, when present, is trifling. The two approaches are also on a par with respect to liking for the subject being taught.

Effects of General Climate

In deciding about the climate or the "group-centeredness" of the classroom, the early investigators relied on the actions or statements of the teacher. More recent investigations, however, on deciding about the climate, also take account of group outcomes, or student attitude, or behavior. In trying to decide about the climate they ask students if their relations with other classmates are friendly? Formal or intimate? Is there a good deal of friction? What about cliques? Are rigid rules much in evidence? Or are actions governed by informal controls? How much voice do students have? What about pressure toward productivity? Equipment to facilitate it? (Anderson, G. J., 1970).

When climate is considered thus broadly, the results are exceedingly complex. In Anderson's study (1970) a few of these indicators of climate were regularly associated with higher achievement in high school physics. But many results showed no relation, or a negative relation. Some of the relations were most intricate. For girls with a high IQ, for instance, the more *friendliness* and the less *apathy* the greater the achievement. For girls with a lower IQ, however, the relations were reversed. Low friendliness and high apathy meant greater achievement. Friction has a curved effect. There is most achievement when friction is either high or low. A moderate amount is detrimental. But we are still not done with complexity. High friction helps bright girls, hurts dull girls!

It is possible, of course, that the truth actually resides in this complex pattern of interactions and curved relations (see Chapter 11). In becoming less formal, and more casual, you may help some students, hurt others, and leave still others unaffected. In the same way, the chef, in adding more salt to his cooking, can help some of his patrons and make things more difficult for others. At present, however, it would be unwise to accept each of these intricate complexities as something true in its own right. We can assume that general climate plays a part in the attitude, manner, and style of the child. The effects on achievement are highly diverse, and at the moment probably unpredictable.

The Complexity of the Issues

There is every reason to recommend a great deal of flexibility in making decisions about the use of group-centered teaching (Flanders, 1960a). What will work for one teacher may not work for another, and the teacher's inner need system may have much to say as to whether this approach is natural for him. Teachers who are unhappy with abstract ideas, for instance, and who are strongly oriented to the immediate concrete particulars tend to be colder toward their pupils, less perceptive of children's needs, more rigid, and less inclined to encourage individual responsibility or creative action (Harvey and others, 1968). Yet we would hesitate to say that there is no place in the profession for teachers who are most at home with concrete particulars.

Even the same teacher may find himself likely to use the democratic, group-centered approach with one group, but likely to use a more directive method with another group. In teaching a bright, well-behaved class, interested in the subject, you may find a group-centered approach the most natural procedure to adopt (Wandt and Ostreicher, 1953). In teaching a duller, more obstreperous group, with little interest in academic matters, you may find such an approach impractical.

The Inconstancy of Climate The curriculum can make a difference to the climate. Students exposed to the new "discovery" oriented science courses, for instance, report climates which are more democratic, more flexible, less threatening, and which permit more flexibility and diversity (Anderson, Walberg, and Welch, 1969).

Within the same class and the same curriculum the teacher's approach may shift from one subject to another. In directing a drill session, for instance, or in shepherding a group on a visit to a factory, the teacher may issue crisp, unambiguous orders. In planning a class election, on the other hand, he may appear to be merely one more member of the group and may seem willing to go along with any decision the class may reach.

Some teachers make no bones about the fact that they use different approaches under different conditions. Some may rigidly and successfully employ one approach throughout. Still others may profess to use the group-centered approach exclusively, but this claim may not be supported by people observing their instruction (Wandt and Ostreicher, 1953).

It would seem best to be open and aboveboard in this matter. Attempting to delude either yourself or your students could lead to trouble. Don't act as if you are following "our" goals when really you are imposing your own goals upon the students. When things are arbitrary, and often they may be, it might even be better to exaggerate the arbitrary features, perhaps relieving them with sardonic humor, than to act as if you were employing group-centered techniques when this is not the case.

The Separate Facets of Climate Many writers have spoken of climate as a single global affair. To use the group-centered approach you must be democratic *and* supportive *and* tolerant of diversity. It may be true, of course, that each of these qualities is necessary. It is highly unlikely, however, that all go together in one inseparable package. As with parent-child relations (Chapter 12), restrictiveness or control may be one dimension, and affection or support may lie along a dimension that is quite independent. At the college level, Costin (1971) found four separate factors involved in students' rating of classroom climate. One of these turned out to be the autocratic-democratic dimension. (Did the instructor set the objectives and direct the discussion? Or were these left partially to the students?) An instructor's status on this dimension, however, was totally unrelated to his warmth in his relations to his students. His standing on this authoritative dimension, moreover, had no bearing on the extent to which students took part in the class, or interacted with each other. It was somewhat related, however, to the instructor's tendency to offer praise, or to welcome the expression of student opinion.

If you choose, you can accept one part of the package without buying the rest. A teacher can be warm and friendly and can provide much emotional support even though he has no intention of letting the class set the goals of instruction. Many a teacher, inflexibly committed to certain intellectual goals, can maneuver his pupils toward those goals by a velvet touch that the pupils in no way resent, and may even relish. Another teacher can be noisy, demanding, dominating, and even humorously abusive, and yet, by the vigor of his demands, and by his insistence that they meet his standards, he may convince the students that each and every pupil matters to him and has his genuine concern. Many such assertive teachers, taken almost from the pages of *Life with Father,* succeed in creating an atmosphere of vast security and robust give-and-take. Many people, in retrospect, feel that life would have been somehow poorer if they had never been exposed to one of these noisy, demanding, but fair and interesting autocrats. By no stretch of the imagination, however, could such teachers be called democratic in the sense of permitting the pupils to set the goals.

Psychological Distance and Leader Effectiveness

This study made use of a new measure called *assumed similarity of opposites* (ASO). To get such a measure you ask a man, "Of all the people with whom you have ever worked, whom did you like the best? *B* Whom did you like the least?" *L* He then rates B on some 40 characteristics (friendly-unfriendly; bold-timid; gloomy-cheerful). When he has finished his ratings for B, he rates L on the same list. To the rater B and L represent the extremes of liking versus disliking. Yet some raters will give almost the same ratings to B and to L. Such raters would have a high ASO score. Other raters will make widely differing ratings of the co-worker they liked best and the one they liked least, thus obtaining a low ASO score. This latter man, who makes clear-cut distinctions between those he prefers and those he does not, is considered to have a strong tendency to remain impersonal and to maintain psychological distance.

With this measure available, the investigators studied a group of 12 high school basketball teams and another group of 22 student surveying parties made up of 3 or 4 men to a party. First, for each team or party, they tried to find the informal leader or the most influential member. The "leaders" then took the ASO test. Reversing the ASO score to get a measure of psychological distance, we find that in each case the "leader" with the greatest psychological distance tends to have the most successful group. For the basketball teams, the "distance" score of the "leader" correlated from .69 to .58 with games won. For the survey parties, "distance" correlated .51 with an instructor's rating of the party's success.

SOURCE: F. E. Fiedler, *Leader Attitudes and Group Effectiveness* (Urbana, Ill.: University of Illinois Press, 1958). Reprinted in D. Cartwright and A. Zander, *Group Dynamics: Research and Theory,* 2d ed. (New York: Harper & Row, Publishers, Inc., 1960), pp. 586–606.

Varying Needs for Psychological Distance People who are responsible for the activities of others often feel the need to maintain a certain amount of distance (Fiedler, 1958, 1962). Some people feel an intense need for a great deal of privacy or distance. Other people need much less and feel the need less urgently. One man might go to some trouble to maintain exceptional distance from his subordinates when he has one job, such as serving as captain of an ocean ship, but may get along comfortably with less distance when facing some other task.

Teachers, like other people, probably vary in this need for psychological distance. One teacher may work most effectively and most naturally when he can maintain a degree of privacy and when his important ideas and concerns can be kept to himself until he is ready to display them. Other teachers may feel natural and secure even when all their doubts and hesitations are exposed to the full light of student observation. The teacher who has a strong need for considerable distance may not relish some features of group-centered teaching. He might be more effective if in much of his instruction he frankly used a clear-cut teacher-centered approach.

No one should feel ashamed, by the way, over his need for some distance. Effective leadership usually calls for a certain amount. The question is just how much, and how it can be attained. You should take stock of yourself as objectively as possible and try to decide how much you need. You should then work out a situation in which you can function effectively.

Individual Reaction to Group Forces

For different children, the influence of the group may be powerful or negligible, helpful or a problem. Some of these pressures are inevitable, no matter what the teacher may choose to do. Other pressures may be facilitated, managed, or directed.

For young children a strong orientation to groups and to other children seems to be helpful. It is true, at least, that children so oriented do better in schoolwork. The precise causal pattern is difficult to determine. For college students, however, things are the other way around. On the average, the college student with strong social inclinations falls behind his more solitary classmate (O'Shea, 1969).

Conformity Pressures

A group, working on an important issue, tends to be very intolerant of deviant or minority views. Much of the group's time is spent in trying to bring the dissenter into line. Clearly this is likely to occur in the jury situation when the holdout is causing a great deal of inconvenience. But the group's demand for conformity will be seen even when there is no practical need for unanimity and when the minority could simply be outvoted. In many groups, the existence of divergent views seems to be distressing in some primitive fashion, quite apart from the practical implications of such divergent opinions.

Naturally, groups vary in this urge to bring the minority into line. Many groups may feel indulgent when they see an old and trusted member take a minority stand, but they would attack an untried newcomer if he showed the same departure from the majority position. Some groups are exceedingly demanding in the sense that they will not tolerate the slightest departure from the approved way of doing things.

Groups may also vary in the range of things on which a group passes judgment. An organization may pass judgment on many areas of a man's life—on his dress, on his social graces, on his personality, and on his opinions. In other groups, a member may merely have to watch his step with respect to a few things. No one bothers about the rest of his life. Groups differ, moreover, in the intensity of the disapproval or approval. In some groups a person's misstep may bring down official thunder. In other groups he may encounter nothing more serious than a raised eyebrow. Finally, we will find differences in the extent to which the group presents a solid front to its members. In some circles the individual can expect unanimous approval or disapproval. In others he may merely sense a majority view offset by a number of dissenters (Jackson, 1960).

This tyranny of the group has been greatly deplored and, on every hand, teachers are urged to be more tolerant of diversity (Chapter 11). We are urged especially to tolerate or encourage divergent approaches to the same goal. To many thoughtful adults there is something unattractive in the regimentation or slavish conformity to be seen in tastes, preferences, and in the widespread use of the latest catchphrase.

For all the dangers of excess, we should be reconciled to the operation of moderate pressures toward conformity. The insecure or troubled person often feels more at ease when the group does take a hand in many areas of his life. He likes to feel that *everybody* cares a *great deal* about *everything* he does, even if that concern shows itself in occasional disapproval (Jackson, 1960). Perhaps under the ideal arrangement, young children, and the emotionally immature of all ages, should feel group demands in many areas of life. As maturity develops, however, groups should be encouraged to respect, and relish, individual behavior, and individuals should be encouraged to resist unwarranted group coercion.

Individual Urges to Conform Most of us need very little pressure to bring us into line. As soon as we find ourselves in a minority position we feel uncomfortable and tend to reexamine our stand. Indeed, some people will change their minds immediately if they find themselves at odds with the group. Others will retain their minority views, but find it necessary to persuade themselves that other people would really agree if they were free to express their honest opinions. Even in such seemingly objective things as judging the length of two lines, your judgment may be influenced by the opinion of others. You think that x is the longer line. But the vote seems to indicate that most people are voting for *y*. Will you change your vote? Most people will. This tendency to fit in with the majority varies, of course, from person to person. Those who resist are somewhat more intelligent, have stronger ego feelings, and are more individualistic in other ways. They are also more likely to be familiar with the material being judged (Crutchfield, 1955). People who are highly influenced by conformity pressures are also somewhat more suggestible and susceptible to hypnosis. Naturally enough, age plays a part in this susceptibility to conformity. Young children are rather unpredictable. They can resist suggestions quite vehemently. Yet in many areas, such as making donations to the needy, they are clearly inclined to follow the pattern set by the group (Hartup, 1970). It is during the preadolescent period that conformity becomes most influential. At one time it was thought that first-born children were more likely to conform, but this is now being questioned (Rhine, 1969). At most ages, girls are especially susceptible to conformity pressures. Boys, however, can be even more susceptible when there is a strong appeal to the boy's achievement needs (Hartup, 1970).

Group versus Individual Attainment

In solving some kinds of problems or in reaching some kinds of decisions, a group can be more successful than a single individual. At the very least, other people can provide courage and moral support when one of their number is dealing with a serious or worrisome issue. Beyond that, group interaction may produce a solution that would escape any single individual. One person, for instance, may suggest a vague or somewhat erroneous idea. His colleague would never have thought of this on his own, but now that it is mentioned, he can straighten it out and round it off. Together, they produce a working idea. Alone, neither would produce anything useful. Many people, moreover, are motivated and activated by a group. The things that happen in a group lead them to exert themselves more vigorously.

But group thinking is not always superior and at times the creative products of a committee might be worse than that of the least gifted member. In some activities the group has much to offer. In others it may be a handicap (Amaria, Biran, and Leith, 1969; Lemke, Randle, and Robertshaw, 1969; Wallen and Travers, 1963). The group has marked advantages when success in the task hinges on someone coming up with the right guess (as in guessing a word for a crossword puzzle, or in catching on to the crucial feature of a certain concept), or when each separate suggestion may be important in its own right (as in checking a proposed plan for possible flaws). With more and more people in the group there is a greater chance that at least one person will suggest something useful. The comments of one person, moreover, may act as suggestions for another member and also stimulate him to do his best.

In solving a crossword puzzle, prolific guessing helps. You can quickly find out if a guess is wrong, and an erroneous guess does little harm. One correct guess will wipe out all the errors. In constructing a crossword puzzle, on the other hand, it takes some time and trouble to find out if a proposed word will prove feasible. Often you will not know until the whole puzzle is almost complete. Here a useless guess can lead to a great waste of time. The separate tasks, moreover, are highly interrelated. The proposed solution for one space sets the problem for the next. Under these circumstances the group will typically be inferior to the individual. In working on a complex problem it is unlikely that a group can succeed unless there is at least one member of the group who could solve it on his own. If you could identify this person in advance, the group would contribute little if anything.

To sum up: Group problem solving is very useful when the solution calls for the production of many separate guesses and when the useless guesses can be quickly detected and dismissed. The group performance falls below individual performance when there is a complex sequence of steps and when the adequacy of each proposal is more difficult to determine.

Effects of Group Size and Cohesion

In planning for a program of successful group experience, you will want to take the size of the groups into account. There are important differences between smaller and larger groups (Thomas and Fink, 1963). A group of 5, for instance, will reach a consensus more quickly than a group of 12, especially if working under pressure. The presence of many noncontributing members, moreover, often inhibits the performance of the workers, and in a group of 12, or even in a group of 7, there may be several people who do not contribute at all and whose ideas never come before the group. In groups of 3, 4, or 5 this is less likely. Here the shy person is less inhibited, and since his silence is more obvious in the small group, there is more pressure on him to take part. In the small group, moreover, there is less need for a clearly defined issue. Quite often a small group can be assigned a rather vague problem and still get somewhere. This is not so likely in the larger group. The small group lends itself to a different kind of atmosphere and a different kind of leadership (Hartup, 1970). As the group gets larger and larger, we find more and more that one prolific contributor almost takes over. There is a "runner-up," quite a distance behind, and then a very few who make some scattered contributions. The contributor in this case is likely to be a fairly positive fellow with a good deal of initiative and a liking for authority. The leadership that emerges in this larger group tends to be formal and authoritative. Added to all this is the fact that at the high school level, at least, most students report more satisfaction in their work and feel more confidence in the decisions reached when working with small groups. Finally, groups of 12 or larger tend to break up into small groups no matter how they are formed originally.

Obviously there are many advantages for the small group. The picture, however, is not completely one-sided. In the first place, there are fewer ideas or suggestions to be had from a small group. Although it will frighten many people into silence, the large group by sheer virtue of numbers will put out a larger number of suggestions. This trend holds for groups up to 90 or 100. The sense of ease and congeniality in the small group, moreover, is not always an unmixed blessing. Sometimes contention and opposition may prove useful, partly by bringing out genuine weakness in proposals and partly by stimulating some people to more adequate suggestions. In the small group we may not find the range of views and temperaments necessary for this salutary clash. In some cases the larger group is less at the mercy of a really troublesome member. An obstreperous person who might wreck a small group has more chance of being kept in line within a larger group. For one thing, sheer size may inhibit him as it does others. Even if it does not, there is more chance that the larger group may include someone who can deal with him.

Groups of the same size may vary in cohesion. A closely knit group, such as a group of intimate friends, will often reach a decision more promptly than a diffuse group in which some of the members must spend some time in hesitantly sounding out the others. The cohesive group also has an advantage in completing an easy or simple task (Hartup, 1970). Cohesion is especially influential, by the way, when one of the group goals is to keep performance down, as when students or factory workers try to prevent any one person from seeming too good. In tasks that are difficult or intricate, the less cohesive groups are more effective (Hartup, 1970).

Leadership in the Classroom

Leadership will be an issue in your class whether you want it to be or not. Some pattern of leadership is bound to emerge, either organized around you or organized without respect to you. You will also have to exert some leadership either through one approach or through another. Finally, there is the real obligation to help the pupils develop greater skill as leaders.

Emergent or De Facto *Leader*

As the power structure begins to develop within a group, one person will seem to acquire more than his share of influence. He may exert this influence by contributing ideas and information, by providing a friendly atmosphere, by making decisions, or by verbalizing decisions toward which the group is moving, or by sheer labor (Bartlett, 1959). At times the group may elect such a person to some office, or some higher authority may appoint him to a position of official influence. But even if neither of these things occurs, the person is clearly exercising leadership. Such a person is called an *emergent leader*.

The emergent leader is likely to have a general feeling of security. He is also likely to act spontaneously and confidently when the situation calls for action. In a minor emergency, for instance, while most of us stand around wondering what to do, the potential leader is likely to move confidently and unhesitatingly toward some proposed solution. More often than not, his proposed solution is reasonably effective. At least it does not turn out to be foolish, although its real effectiveness may never be known. To move spontaneously toward a reasonably acceptable solution, a person must not only have a measure of security or self-confidence but he must also have a certain amount of competence in the field. The experienced woodsman might "take command" readily and satisfactorily in a camping incident. His confidence may desert him, however, when he must deal with an unruly child in a public place (Hartup, 1970). In this latter situation, moreover, the steps that first occur to him may lead to results that are clearly unacceptable. All in all, we would not be surprised if the person who is influential in one field (evaluating the intellectual worth of a given college course) may have less to say in a different field (planning the graduation dance).

It is as the task becomes more demanding and exacting that the qualities of leadership are more likely to become apparent. These qualities vary from age to age. Among young children the bossy, dominating youngster can have a marked influence on his companions. For preadolescents, on the other hand, a child is less likely to be influential unless he is also popular, although this is not strictly necessary. With adolescents even more subtlety is required. The influential high school student is more likely to persuade than to give outright commands.

These age changes in patterns of influence do not necessarily mean that the influential six-year-old cannot be an influential adolescent. For one thing, the important confidence and security may well persist from one age to another. Second, the bossy six-year-old may well turn into a persuasive adolescent.

The Official Leader

Many people are extremely influential and are still never named to office. The qualities necessary to be influential are not sufficient to ensure official election or to encourage appointment by superiors.

Elected Leaders The influential person does not have to be talkative, genial, or enthusiastic. These qualities are important, however, when it comes to being elected. Indeed, to become elected, it is more important to be conspicuous and vigorous than to provide helpful direction. Friendliness and sociability also help but cannot be substituted for prominence and vigor. In view of the role of prominence, it is not surprising to find that sheer physical bulk may also help a little. Elected leaders are, on the average, a little taller and heavier than the nonleaders. For social leadership, general appearance plays a part. The leader is also somewhat ahead in intelligence and in scholastic or other achievement. He is more self-assured, more adventurous, and more capable of warm, human responses. He is persistent, industrious, tends to dominate, and has objectives that excel those of his fellows. He is likely to be aware of his powers and limitations. Where such things are valued, he has often superior family background. In all this, the leader cannot depart too much from the norms of the group. He is only slightly more intelligent, slightly more dominant, slightly more adventurous. The one who is markedly out of line in any way is not likely to be elected.

Clearly there is an intricate relationship among friendships, social participation, and election to office. Friendships help with election and lead to participation. Conversely, many students specify high participation as something they require in their friends. Participation helps one become elected. Conversely, to participate in some councils or committee work one must be elected. It is not surprising then to find that the description of the elected leader is also a fair description of the student who is generally socially active—who goes to dances, attends meetings, and takes part in voluntary group activities. Like the leader, such a student has fairly high drives, is self-assured, and gives evidence of general social maturity. He is especially likely to have a favorable socioeconomic background.

Appointed Leaders The teacher, of course, is neither an emergent nor an elected leader but someone who is appointed. Obviously there is no necessity that the appointed leader shall have demonstrated his ability to exert influence. The teacher, for instance, and the army officer have to be leaders, but they are seldom required to show that they could exert influence within the group they are asked to lead, or that they could be formally elected by the group.

Leadership: Worries and Tasks

In any position of leadership there are unpleasant decisions to be made. Subordinates must be evaluated. Rewards must be passed out to some people and withheld from others. One person must be selected for a committee post and others must be disappointed. At times, some people must be promoted and others denied promotion or discharged. Most leaders, elected or appointed, are torn between the necessity of making unpleasant decisions and the conflicting need to be liked or to retain one's own self-respect. This is an age-old theme in high drama and in ordinary life. The good king, depressed by the need of imposing unwelcome or harsh decisions, willingly gives way to a less scrupulous successor and, through his very "goodness," opens the door to evil (West, 1957). The appointed college leader, contemplating decisions that are bound to displease some of his buddies, resigns his position of leadership.

If we examine existing leaders, by the way, we will find that these unpleasant duties give less trouble to emergent or elected leaders than to appointed leaders (Carter, 1951). The emergent leader regularly encountered these problems on his way up and he had to find some way of living with them in order to survive. The appointed leader, on the other hand, may have served no such apprenticeship and may find such problems thrust upon him with no effective advance warning.

Lecture vs. Discussion in Changing Attitudes

This investigation was carried on during World War II and was concerned with the attempt to get housewives to make more use of the less popular beef products such as heart, kidneys, or sweetbreads. There were "six Red Cross groups of volunteers organized for home nursing." Three groups were given a 45-minute lecture dealing with the nutritive qualities of the foods being discussed, the importance of the problem for the war effort, and specific procedures for making these meats more attractive. The lecturer gave out mimeographed recipes and told how much her family had enjoyed them.

In the other three groups the emphasis was on group discussion. The leader presented the general question and invited comments. He especially asked the women to comment on the problems that would be encountered in trying to use more meats of this kind. After the group had become involved in the discussion, the nutrition expert presented the same factual information about vitamins, economy, and methods for preparation. The groups were then asked to indicate by a show of hands how many were willing to try one of these meats within the next week.

Here, then, we have the effects of a lecture compared to the effects of group discussion, plus an overt group decision. Some 32 percent of the latter group actually did serve one of the meats, whereas only 3 percent of the lecture group did so.

SOURCE: K. Lewin, Studies in group decision, in D. Cartwright and A. Zander, eds., *Group Dynamics: Research and Theory* (New York: Harper & Row, Publishers, Inc., 1953), pp. 287–288.

Reaching a Satisfactory Decision Often it is imperative that the group reach some decision. The committee must bring in a report, the jury must reach a verdict. It is hoped, of course, that the decision will turn out to be a good one. But that is often hard to decide and much of the immediate pressure will be toward reaching a decision that is reasonably satisfactory to the group.

In reaching this decision, the leader should go to some trouble to obtain as many views as possible. It is part of the democratic process that as many people as possible should be heard from. As a practical matter, moreover, the group can only consider the merits of those proposals that are expressed. A useful, unmentioned idea would be lost. The expression of one view, moreover, might lead a second member to think of something valuable that otherwise would never have occurred to him. Finally, there is a strategic value in encouraging the widespread expression of views. People are less likely to support a decision if they feel that they never had a chance to express their opinion in the matter. Those who had their full say in reaching the decision are more likely to support it, whether or not the decision is in accord with their views.

Dealing with Conformity Pressures If he chooses, the leader can make use of both the group pressures and the individual urge to conform. Suppose, for instance, that you decide to try to change the attitude of your class. You decide, in this case, to try to get the pupils to read something besides comic books. Theoretically, of course, you could try to persuade each pupil individually. But this would mean that you would be working against the pull of the group. As each pupil was about to change his views he would be held back by his ideas of what the group felt. In a genuine group discussion, on the other hand, the pressures are often reversed. Suppose that you are fortunate and the group as a whole does begin to lean slightly in your direction. If the group discusses the matter freely, the change should become apparent, and now the pressures to conform will lead each individual to go along with the changes taking place in the group. To make sure that the group changes would be apparent, the early investigators (Lewin, 1953), asked for an actual show of hands. This, of course, meant that each participant was asked to make a decision or commitment. Consequently, we cannot be sure that the persisting changes came from taking part in the discussion or from the fact of having made an overt decision.

Conformity may be made to serve many useful purposes. In searching for the best solution to a problem, however, conformity is often a downright evil. If everybody rushes to agree to the first suggestion, some important possibilities may never be considered. To take care of this problem, the group leader should go to some trouble to bring minority views to the surface (Maier and Solem, 1952). If someone should look hesitant or doubtful, he should be invited to speak up. Two things should follow. First, his view will be presented for consideration. Second, because of his stand, others might be more likely to do some dissenting.

Effective Classroom Groups

To recapitulate, let us bring together some of the major practical implications for developing valuable group experiences in the classroom (see Bany and Johnson, 1964; Long and Newman, 1965). The most obvious of these implications is the need to take account of the group forces at work or available for use. Group forces exist. They are an important feature of life. With good management they can provide rich and rewarding experiences. Group relations are important in their own right, and also play a part in promoting other values such as reasonable order (see below) and academic attainment.

Judicious Use of Group Forces

The fact that group forces can be used for other ends may tempt us to overuse them for this purpose. To keep from thus killing the goose that lays the golden egg, we should invoke only genuine and natural group forces, and not invoke these too often. There is often a powerful group pressure, for instance, to bring the deviant student into line. But this may dissipate rapidly if students see it being used as a tool or a whip.

Maximizing the Chances for Early Success

In group work, as in so many areas, you may wish the group to gain some prompt experience with success. Successful group work is more likely in some tasks than in others. Naturally enough, genuine cooperation is more likely when the group is working on a project from which almost everyone would feel some benefit—ways of improving the snack bar, or the library checkout system (Glidewell and others, 1966). The task, however, should be feasible. It is when the task is unduly frustrating, or when no progress is evident, that beginning groups are most likely to fall apart. Try to make sure that some progress is apparent, either by the selection of the tasks themselves or by using additional means of evaluation to bring out real but hidden progress.

Instead of being too difficult the current task may be too boring or may fail to engage the interest of many members. Whenever our chief goal is effective group work, rather than a given overt task, we should honor these feelings. In group-centered work, discussed earlier, it is one of the responsibilities of the leader to help the group get a fairly clear consensus regarding the new interests that have developed.

In any genuine group work, of course, all kinds of hostilities, intrinsic and accidental, are likely to be at work. Ultimately, moreover, the group should be able to deal with these. At the outset, however, you may want to keep these hostilities to a reasonable minimum. You may be especially anxious to avoid those arising from extrinsic causes. Jane's annoyance with Harold, for instance, may come not from the views he expresses but from the fact that he is getting too much attention. Calling upon Jane and other smoldering silent ones might reduce some of this extrinsic tension. Other hostilities arise not from disagreements about the ostensible topic but from hidden issues on which it may seem to touch. A discussion supposedly on traffic problems may really be a battle between the sexes about women drivers. Such a hidden issue should be brought out into the open. Asked to reflect, the students themselves may point out the real issue. Here, again, it might be wise to change to this "real" issue. If there seems some chance of handling the new question reasonably well, the group might abandon the original topic and deal with this new question. If the question is too explosive or too complex at this stage, it could be looked at and set aside as an acknowledged disagreement—perhaps to discuss later on, perhaps to be left as a disagreement.

Successful experience in early group work should provide its own intrinsic reinforcement. Some tensions fall away. Some harmony becomes apparent. Along with these intrinsic reinforcements, many psychologists would introduce extrinsic rewards (Hartup, 1970). In the Skinnerian approach, the leader would not actually point out that a certain kind of behavior was being rewarded. Following a reasonably successful performance, an interesting—and hopefully relevant—film might be presented, or an attractive expedition arranged. Certainly, when a reasonable decision has been reached (e.g., on how to decorate the classroom), it could be implemented promptly and in a way that would include attractive physical features.

Discipline and the Group Process

The word "discipline" has a wide range of meanings. In its most exalted sense it means self-discipline—the process whereby a student comes to regulate his own behavior to fit in with his own larger purposes or the needs of others. Used in this sense, discipline includes virtually the whole of character education (Chapter 14). In its narrowest sense—and a sense not used here—the word discipline simply means punishment, as when we say that someone has been "disciplined." However, when teachers talk about matters on discipline they typically refer to the problem of maintaining classroom order, and that is the issue we consider in this section.

Discipline in Perspective

In concentrating, for the time being, on this exceedingly practical issue, we in no way dismiss the larger topics treated in the discussions of psychology and teaching. The nagging, petty problems of classroom management are intimately linked to the larger concerns of teaching style, motivation, strategies for ensuring success, the important pulls and pushes of group forces, and the incorporation of mental hygiene principles into daily classroom practice.

Facing the Problem of Surface Behavior But for all the basic forces that it taps, surface behavior in the school, like surface behavior in other areas, exists and it has its own impact which we would be foolish to ignore. Within the home, the child's incessant midnight cough, for instance, is clearly in the realm of surface behavior and its real significance lies in the operation of powerful forces, some pathologic, some wholesomely corrective. But this surface behavior is still there and, along with their concern for the child's recovery, the parents must fervently wish that the coughing would stop.

Parents may feel unnecessary shame over their sleepy preoccupation with this worrisome surface behavior. Teachers may also feel petty and troubled over their concern with the nagging incidentals of keeping order. This sheepish feeling, unfortunately, has been reinforced by the noble sentiments of some administrators and others, many of whom are not directly exposed to classroom worries. As a result, the problems of classroom management have all too often been given a hush-hush treatment (Ladd, 1958). Many educators have written as if problems of maintaining classroom order do not exist, or as if only poor teachers had such problems, and that anyone confessing to management difficulties would immediately put himself beyond the pale. Even where problems of order are acknowledged, advice to teachers rarely extends beyond such simplified clichés as "create rapport," "make learning interesting," or "manifest friendliness, warmth, patience, understanding, and love for children." No one should sneer at these desirable attributes, but, in themselves, they will not manage a classroom (Kounin, 1970). Often they must be supplemented by exceedingly practical steps.

The Extent of Disciplinary Worries To do anything useful about the problem of keeping order we must look at the problem openly and without a sense of shame. Classroom management is often a serious worry (Crawford and Harrington, 1961). In one southwestern high school (Zeitlin, 1962), 80 percent of the teachers made routine disciplinary reports and these involved 40 percent of the students. After poor salaries and lack of facilities, discipline is the concern most frequently aired by teachers when speaking frankly and anonymously (Ladd, 1958). Discipline is also the major worry of some 70 percent of beginning teachers. Experience is no automatic solution. There is no reduction of reports as experience increases. Many teachers have guilty feelings in the matter. Morale improves noticeably when teachers feel that they can openly report disciplinary problems without automatically laying themselves open to charges of inadequacy.

Disruptive Behavior and the Group Process Not all disruptive behavior should be considered pathological or as an indication of poor teaching. True enough, poor teaching can produce some disciplinary problems and can aggravate others. But these defects should be corrected, even if there were no problem of discipline. Altogether it would seem more wholesome to regard many disciplinary incidents as natural features of the group process. It is the presence of the other people in the group which brings out much of the behavior in question. To a great extent, moreover, the behavior is regarded as troublesome largely because of the group situation. Harry's urge to laugh and shout is quite wholesome in general. But, when carried out in the group, this wholesome urge interferes with Arthur's wholesome urge to finish his poem, or the urge of some other students to concentrate on their discussion. The situation calls for management and control, but it carries no suggestion of serious pathology or inadequacy. Rather than plaintively asking, "What did I do wrong?" we should quietly visualize the group problems that now exist, and should then invoke group processes to try to improve the situation—to some extent.

Types of Disciplinary Problems

Reports of teachers (Zeitlin, 1962, 1956) make most frequent mention of such disciplinary problems as lateness, truancy, general disturbances (noise-making or clowning), disobedience (refusal to comply with teacher directives), and disrespect (direct challenges to the teacher's authority and/or competence). Here we see behavior that is natural and frequent in adolescence, but which is nonetheless very unnerving and frustrating. Indifference and failure to complete work are also mentioned. So is cheating. More worrisome violations are also mentioned but less frequently. Only 1 or 2 percent of teachers report having been assaulted. Naturally the reports stress behavior likely to occur in the classroom and are less likely to include such things as smoking, serious fighting, gambling, drinking, or theft. Presumably these things, along with drug abuse, are offenses for the corridor, playgrounds, or washrooms.

The Dimensions of Problem Behavior Obviously there are many kinds of problem behavior, and psychologists have tried to classify these to see if some can be legitimately grouped together or perhaps placed on a few separate dimensions. First of all, there has been an attempt to set separate problems into two broad classes: the personal or psychogenic problems on the one hand, and the conduct or sociogenic problems on the other (Quay and Quay, 1965; Peterson, 1961). Basically, of course, the two types may be closely intertwined. On the surface, however, the one is shown by withdrawal or a sense of inferiority, the other by aggressive, destructive, or disruptive behavior. It is the latter type which superficially is most closely related to this discussion of discipline. Personality problems are discussed in Chapter 16.

Among the problems in the conduct area, Phillips (1968) has suggested a number of dimensions. One of these is diffuse hyperactivity and involves restlessness, disorderly behavior, compulsive talking, and interrupting. It also includes embarrassing things like belching and nose-picking. A second factor is overt derogation of others. This is shown by tattling, overcritical behavior, jealousy, and expressions of contempt. A third factor in the area of conduct is labeled aggression with independence strivings. It includes impertinence, rudeness, sullenness, defiance, resistance to authority, quarreling, and fighting.

The Role of Circumstances Disciplinary incidents are more likely to be reported in some situations than in others. Reports are more likely to come from required courses than from elective courses. Women issue more reports than men. More problems are reported in classes where there are many failing pupils. There are many more reports for boys than for girls, and more reports for certain minority groups (black students and Spanish-American) than for the middle-class white student.

It is difficult to know the causal pattern underlying these relations. Some teachers may be quite free to make reports, others more reluctant. Female teachers, who give more disciplinary reports in general, may be especially perturbed by the misbehavior of boys. Some teachers may expect poorer behavior from certain minority groups and may then see what they expect to see. Academic failure may lead to misbehavior. Misbehavior may lead to poorer performance or to poorer grades assigned as punishment. The same unfortunate background condition may be responsible for both failure and misbehavior.

Preventing Infractions

Ideally, we should manage things to keep worrisome infractions to an acceptable minimum. It is the prevention of infractions rather than the treatment of actual infractions which distinguishes the successful class "manager" from his more confused colleagues (Kounin, 1970).

A Task-Oriented Attitude Discipline presents one problem when the students are highly motivated and interested in the subject (Kounin and others, 1961) and quite another problem when motivation is low. When motivation is high, the student tends to judge the teacher's work impersonally; the teacher's behavior is linked to the work to be learned. When motivation is high, moreover, students are not disturbed by the matter-of-fact admonition directed to one student. The students not admonished consider this a normal necessity for getting on with the work. In a poorly motivated class, however, such an admonition will cause a *ripple effect* (see below) and will start the other students thinking about fairness, meanness, and who will win out.

We must not imply that, merely by taking thought, the teacher can transform any class into a highly motivated group intent on the business of learning something. We shall profit from anything that we can accomplish in this matter, but we should not expect miracles. The teacher, of course, can do something toward establishing the idea that the pupils are in his class to learn. He can also keep his own efforts oriented to the task at hand. As far as the onlookers are concerned, a verbal reprimand is disturbing or distracting when the teacher stresses the fact that he does not like that behavior or that he won't stand for it. The reprimand is less disturbing to the other students and leaves a better taste if the teacher shows how the student's act interferes with the work at hand.

This task-oriented approach is perhaps one of the most important facets of good discipline. Keep the class moving toward the goal that is established. As far as possible prevent any interruptions to this progress. When someone does interrupt the progress, deal with it as an interruption and not as a challenge to you as a person. Don't let your personal feelings dominate. Ventilating them will prolong the interruption to the task and will distract the attention from the job and direct it to you and to your likes and tolerances.

Manifesting Confidence You can't automatically become confident just by deciding that you will be, but there are some things you might remember that should help. First of all, you can expect that most behavior will be acceptable. Second, remember that not all offenses are direct attacks on you. Many of them are sheer thoughtlessness or exploitations of an inviting situation or even the expression of antagonism, not toward you but toward the school, toward adults, or toward the world in general. These offenses must be dealt with, but you can feel better about them if you don't take them personally.

Whatever you can or cannot do about increasing your own feeling of confidence, there are many things you can do to portray to good advantage the confidence that you do feel. Take praise, for instance. The ability to praise is often considered the mark of the secure and confident person. He can take note of the good work of others without feeling any threat to himself. Use praise whenever it is in order. This is good in itself and it also promotes an atmosphere of confidence and security.

Sometimes a slight change in posture may give the impression of confidence. Stay close to the class and make your presence felt. Resist any temptation to remain frozen behind the desk.

Avoiding Unnecessary Ambiguity It would be a mistake to start off your association with a class by giving a long list of the detailed prohibitions and restrictions you expect to maintain. This would certainly emphasize the negative features of your relationship, and to some students this might serve as a challenge. If, however, there are a few important rules that really must be honored, and especially if some of these might come into play in the near future, you would do well to make them clear fairly soon. Often you can make such instructions more palatable by stressing the things that students will be permitted to do and by introducing the restrictions as qualifications or limitations of these privileges. But be careful not to sound hypocritical in this matter. If the necessary restrictions are nakedly irksome, present them as such, pointing out that they are part of the facts of life but that they need not spoil the interesting experiences which lie ahead.

Minimizing Unfavorable Conditions One of the simplest steps to reduce the number of infractions is to prevent the outward conditions in which such infractions flourish. We can try to arrange for a favorable situation or to structure the existing situation in the most favorable manner (Reese, 1966). We can try to avoid cramped space conditions, shortages of materials, unnecessary time pressure, and other irritants. Some periods of the day or days of the week may be especially hazardous. Management problems may become more troublesome just before lunch or just before dismissal. Student restlessness increases on Fridays and just before vacations. At such times we may be able to schedule activities that do not involve delicate management problems.

Disciplinary problems are more serious in some activities than in others. An expedition by bus, for instance, may be the occasion for rowdiness. If you feel this is likely to get out of hand, you might be able to postpone the trip until you feel more secure in your relation with the class.

Reducing Confusion and Lulls Disciplinary incidents are more likely to occur when there is confusion about the task at hand. This happens when the teacher himself seems confused and helpless. It also happens during an irrelevant lull in the activity, or during an awkward transition from one activity to another. Those who have observed classroom teachers (Kounin, 1970; Celler, 1948) have concluded that it is this ability to avoid such awkward or confused lulls which characterizes the teacher who has little trouble with class management. Such teachers avoid the appearance of helplessness and confusion. At the start of the class, for instance, they never try to teach into irrelevant noise. If the shuffling and banging are inherent in getting settled, they wait until the settling has taken place. If it has gone on too long, they use some signal to bring it to a stop. But they do not try to conduct actual instruction under these circumstances.

Balky apparatus or film projectors can often contribute to the appearance of helplessness. If you are to use equipment that could get out of order, check it in advance. If it is very temperamental, have some alternative material ready. Go to some trouble to take care of routine tasks, such as passing papers and materials or the movement of pupils to and from the chalkboard. Don't let this become a fetish to the neglect of intrinsic teaching, but keep it from being a frequent source of confusion.

Manifesting Concern Fatigue and boredom invite disciplinary troubles. Both can be reduced by a reasonable variety. Kounin's (1970) successful teachers were noted for their ability to provide a variety of challenging tasks and to switch smoothly from one to the other before apathy or restlessness really set in.

Teachers who manage their classes smoothly are seen to go to some trouble to show their concern for each pupil's involvement in the task. Such teachers, as it happens, make much use of maps, displays, film slides, and other aids. More important, when using these they make a point of being sure that everyone can see and hear. In so doing, they not only get more pupils to see and hear but they also improve the rapport. Their concern helps the teacher and pupil establish a partnership in the task at hand.

One of the features that characterizes the successful class managers (Kounin, 1970; Celler, 1948) is their ability to help the individual child without "losing" the rest of the class in the process. Kounin calls this *overlapping*. If some pupils show unexpected confusion in trying to grasp a point, the successful teacher does not try to ignore the problem or to gloss it over, but patiently tries to clear things up. These activities, of course, typically interfere with the prepared lesson plans, and the good disciplinarian has prepared for this possibility by having more than one way in which he can complete the lesson. By glances, posture, and occasional interjection he also maintains contact with the rest of the class during these asides.

Manifesting Presence In the process of overlapping, the teacher maintains contact with the whole group, even though much of his attention is directed to the problems of an individual child or to the messenger at the door. This urge to maintain contact, and the ability to do so, is one of the outstanding characteristics of the teacher who has few classroom problems. Such teachers are anything but reticent in their relations with pupils. They encourage communication—almost insist upon it—and in general the communication they get is ready and free rather than formal. Most of the time the communication is friendly and objective, but sometimes there is a spirited interchange. Some teachers achieve directness by an assertive, almost aggressive tone.

Whatever your manner or tone, you should never try to will your students into nothingness or pretend that you yourself are not really there. Come out from behind the desk. Move around the room freely, naturally, as if you enjoyed being there. Speak to the students, not at them, and certainly not at some spot on the opposite wall. As far as possible, speak directly to one student after another. Even if you do not get around to each one, you will accentuate the impression of directness when you are talking to some individual. When possible, call specific students by name.

To urge you toward vigorous and direct contact with students is by no means to urge you to become excessively chummy or familiar. The two do not necessarily go together. A military officer could be forceful, vigorous, and direct in his official dealings with his men, and yet be completely unapproachable as a person. It is unlikely that this military relation would appeal to you as a teacher. But you may well need some measure of reserve or psychological distance if you are to operate freely and to remain reasonably comfortable. Certainly most experienced teachers would urge you not to become overly familiar, especially at first. You yourself can be careful to stay within the limits you set. If you feel that a student is about to step over this line, you can hold him back politely, quietly, perhaps with a joke and a smile. But always do it directly and positively. Never try to protect yourself by retreating into nothingness.

Dealing with Infractions

The key to classroom smoothness is to arrange things so that there will be only a few infractions. But there are bound to be some and it would be unrealistic not to be prepared to deal with these.

Not all infractions, of course, call for deliberate action on the part of the teacher, and there is always the problem of knowing which infraction to take seriously, which to treat lightly, and which to do nothing about.

Infractions to Tolerate Some actions that might disturb you are almost inevitable in any human being. If you inadvertently step on a child's toe, for instance, he may shout at you or give you an angry push. This almost inevitable act calls for an apology and sympathy rather than a reprimand. Other behavior may be disturbing at one age but treated as normal at another. The pushings and rompings in the kindergarten are to be lived with, perhaps to be relished. But not in the high school. A surly, uncommunicative attitude might be criticized in an adult colleague but tolerated in a troubled adolescent.

Other disturbing or inconvenient actions may arise from sheer ignorance of the situation or lack of understanding. These actions, however much in need of correction, should not be treated as infractions but as matters demanding information or instruction. Honest mistakes of this kind should be discussed with no hint of annoyance and certainly with no suggestion of personal rejection by the teacher (Sarason and others, 1960).

Tolerating a questionable act is not the same thing as pretending to ignore it. You can tolerate it by showing sympathetic understanding. Other behavior you can clearly note, but can permit the twinkle in your eye to say, "I see you all right, but we are too busy with something else to stop and deal with you." This attitude suggests a sense of proportion in dealing with minor matters, yet preserves the all-important direct contact. It does not give the impression that you are pretending you are not there.

In pretending that an infraction has not really occurred you place yourself at a disadvantage. It is hard to be convincing. In such a situation students speculate

Students' Views of Discipline

A total of 141 girls and 135 boys from two Georgia high schools were asked to comment on recent behavior for which they had been reprimanded or on corrections they had recently received.

	Percentage of Mentions for Each Type of Behavior	
Misbehavior	*Girls*	*Boys*
Talking, Laughing	66	40
Inattention or Disturbing Class	4	15
Tardiness	5	3
Cutting Classes	3	6

In most cases (43 percent), students were merely reprimanded in class, but 16 percent were reprimanded in private. In some 3 percent of the cases the offender was sent to the principal. In all, 73 percent of girls and 79 percent of boys readily admitted the offenses, and 63 percent of the boys and 52 percent of the girls considered the punishment justifiable. Only a few (less than 10 percent) thought that discipline was too strict or too lax, but some 60 percent thought it was not sufficiently consistent.

SOURCE: K. C. Garrison, A study of student disciplinarian practices in 2 Georgia High Schools, *Journal of Educational Research,* 1959, 53, 153–156.

about what is going on and suspect that the infraction may be repeated (Kounin and others, 1961). It is much better to show that you notice these matters and that you are deliberately deciding to dismiss it or to do something about it. Kounin (1970) lays great stress on this matter of manifesting awareness of what is going on. He and his colleagues use the term "withitness."

Casual Intervention When you decide to discourage some behavior (or to impose *desist* techniques) you may at one time invoke very elaborate sanctions and at other times deal with the matter in a very casual manner. There is much to be said for using a casual approach as far as possible and for reserving the more elaborate procedures for serious problems. At the beginning of some misbehavior you can do much by a significant look, a gesture, or a simple signal. These remind the student that you are there and aware of what is happening. Some teachers find it effective to move closer to the culprit—or to exercise *proximity control* (Long and Newman, 1965).

In more extreme cases, the misbehaving student can be casually "excused" from the classroom, with as little as possible in the way of punishment, scolding, or derogation. This procedure of "antiseptic bouncing" (Redl, 1966) could be used in the spirit of two adults taking a break to relieve some tension. It could even be more subtle, as when the student is sent on an errand, or asked to wash up, or to get a kleenex.

Overt Reprimands The techniques discussed up to this point have much to recommend them. They can be carried out with very little interruption to the major task on which the class is engaged. The casual techniques often carry little threat to the student as a person. We stop the drumming noise he is making, but we do not reject him.

But these casual techniques, like the techniques of prevention, will seldom prove completely adequate. Despite our efforts, we will encounter behavior that demands overt and systematic attention.

Mild versus Intense Reprimands Overt reprimands should not be overly strong. Whereas quiet reprimands have been reported to reduce disruptive behavior (O'Leary and Becker, 1968–1969), loud reprimands when applied later undid the improvement and brought the disruptive behavior back to the original level.

An overt reprimand, especially when it is sharply toned, will have effects other than those intended. Although directed to one pupil, it will have a *ripple effect* on the other pupils. Typically the other students become more subdued and furtive. This effect is most pronounced when the student reprimanded is a leader or a prominent member of the group.

Reprimands and Explanations How much reasoning or explanation should a reprimand contain? There are several different answers. At the one extreme, as we have pointed out, there is the situation which calls only for an explanation with no hint of any reprimand whatever. To avoid any misunderstanding on this point, a skillful teacher will often preface his explanation by a neutralizing statement. He suggests, "I didn't get around to explaining this in our first class, but clothing left on the radiator keeps the air from circulating."

At the other extreme, and this is much more typical, there is no need for any explanation. In the vast majority of disciplinary incidents (Garrison, 1959), the student knows quite well what he has done, and knows that it is an infraction. The only new item of information is that this time his infraction has come to your attention. Under these circumstances an explanation is superfluous and merely functions as an additional and somewhat insulting reprimand. Try to imagine that you yourself have been stopped for speeding or for some similar traffic infraction. You know you were speeding. You know this is wrong. The only new bit of information is the fact that you have been caught. How might you feel when the policeman gently, and patiently, and at length, explains to you why you shouldn't speed? Would you really appreciate the lecture, however kindly its tone? Many people resent being treated as a person who needs to have the obvious explained. A few crisp words of admonition are sufficient to give you "insight" into the fact that the dereliction has been noticed and disapproved, and *under these circumstances* such an insight is all that is likely to be accomplished anyway. A brief admonition might help (see earlier discussion of verbal punishment) and should not cause undue resentment.

When it is really superfluous, even a brief attempt to develop understanding can easily cause resentment. Many explanations, especially superfluous explanations, tend not to be brief. They can easily develop into prolonged harangues. No matter how sweet and patient and gentle, this discourse on the student's dereliction keeps him in an unflattering spotlight. His resentment rises steadily as the explanation goes on and on. To many people the ordeal of these unending talks is much more cruel than an explosive reprimand, however violent, which gets things over in a hurry and permits everyone to get on to something else. In Kounin's (1970) report, the teachers with good classroom relations seldom indulged in this nagging or *overdwelling.*

A prolonged explanation, in addition to causing unnecessary resentment, becomes an accomplice to the very act it censures. Typically, an act is to be criticized because it interferes with the major group task. The explanation, however, provides a further digression and interruption. Unless it accomplishes some higher-level goal it, too, stands condemned.

We have, then, one situation that calls for an explanation but no reprimand and the converse situation that calls for a reprimand but little if any explanation. In between these extremes we find less clear-cut situations. When the misdemeanor has a number of facets, for instance, the student may be genuinely confused about the particular act being scolded. Here we may well point out that we are taking him to task, say, not for breaking the chemistry flask but for pushing the pieces under Robert's desk.

There may be circumstances in which the student knows what he has done but does not realize the full significance of his act. Obviously this misconception should be corrected. Often a brief explanation can be incorporated into a rebuke —"Don't chew the pencil. You can get lead poisoning from the paint." If, however, an extended explanation is necessary, we should face the fact that the reprimanding setting is almost the worst we could choose. At this moment the student has no strong motive to understand basic issues. On the contrary, he has a tremendous urge to defend himself, to rationalize, and to squirm out of an uncomfortable position. Arguments that he could seriously consider under other circumstances, he will now find spurious reasons to reject.

Indicating Acceptance of the Student Somewhere in any reprimand there should be some hint that the pupil as a person is clearly accepted (Sears and Hilgard, 1964). This does not necessarily mean an overt statement to that effect. Even in administering a rough, vigorous (but *brief*, we hope) reprimand there can be clear overtones of acceptance. In our culture, roughness and acceptance are not at all contradictory. Exaggerated, semihumorous violence can convey much basic acceptance. The good-humored attack is a mark of friendship. Humor and a sense of proportion always help. A harsh, unrelieved punitive attitude is another matter. So is biting sarcasm. And, as we have seen, threats and open hostility directed to one student tend to distract the whole class for some time. Behavior of this sort may also reduce the teacher's general academic prestige, especially if the teacher is not well established (Kounin and others, 1961).

Behavior Shaping The Skinnerian technique of behavior shaping has been applied to classroom management. In many studies of this problem, in contrast to most studies of operant conditioning, there is some reliance on aversive stimuli such as reprimands (McAllister and others, 1969; O'Leary and Becker, 1968–1969). In strict theory we should get the best results when desirable behavior is reinforced, and nothing whatever follows from disruptive behavior. Such programs have been reported (Ward and Baker, 1968). As we pointed out earlier, however, it is extremely difficult to be completely convincing in your efforts to ignore some infractions. And even if you yourself ignore them, other students are likely to notice them and to make some reaction, thus providing reinforcement. Desirable behavior, moreover, often has little salience. Often when pupils are doing what they should, things go along smoothly with few outstanding acts that can be reinforced.

Whether for these or for other reasons, investigators of behavior shaping frequently do apply mild reprimands when necessary and find that in systematically reinforcing good behavior and regularly and systematically discouraging behavior that is disruptive, they can reduce the incidence of the disturbing acts. To achieve the consistency and regularity needed in these reinforcement schedules, some programs employ people who specialize in these tasks. Other investigators, however (Hall and others, 1968), try to work out procedures that can be used by a teacher who has many other things to do.

Contingent Rebukes and Rewards in Disciplinary Problems

Of two senior high school English classes, one (12 boys, 13 girls) were used as an experimental group, and the other (13 boys, 13 girls) served as a control. Both groups were taught by the same teacher and were classified as low-level, coming from lower-class homes. Average age for both classes was approximately 17. Both classes had presented disciplinary problems prior to the experiment. Two kinds of behavior, turning around and inappropriate talking, were selected for investigation. During each minute of the class session a check was made to indicate whether or not either of these acts had occurred. These records were regularly made by the teacher, and at times by other observers as well. Records were kept for 27 days before the experiment began (baseline records). During the first 26 days of the experiment the teacher employed two techniques for the experimental group: (a) a stern rebuke ("Jane, stop talking!" "Phil, shut up!"), (b) praising the class for not talking. This reinforcement was given, when appropriate, after each 30 seconds during the first 2 minutes of each class, and at the end of each exercise thereafter. After 26 days of this program, "turning around" was also treated in similar fashion. During this time the teacher made no change in her customary treatment of the control class.

Percentage of Intervals (Minutes) in Which the Undesired Behavior Occurred

	Experimental	*Control*
Inappropriate Talking:		
Baseline (1st 27 days)	25.3%	22.8%
First 5 days of treatment	10.0	22.0
Last 15 days of treatment	4.0	20.0
Turning Around:		
First baseline (1st 27 days)	14.0	14.0
Second baseline (Day 28–Day 53)	17.0	16.0
First 4 days of treatment	6.0	17.0
Last 4 days of treatment	3.0	17.0

Some of the figures are based on estimates from graphs.

SOURCE: Loring W. McAllister, James G. Stackowiak, Donald M. Baer, and Linda Conderman, The application of operant conditioning techniques in a secondary school classroom, *Journal of Applied Behavior Analysis*, 1969, 2(4), 227–285.

Penalties and Ultimate Sanctions

Beyond the reinforcement or the reprimands that the teacher can apply promptly in his own classroom, there may be a need for more serious penalties to be imposed only after careful consideration. There is, of course, much argument about just what we accomplish by these deliberate and belated punishments. Whatever the rationale, however, it is likely that these will continue to be used.

Perhaps these more drastic treatments serve chiefly as symbols of the betrayal of a trust. This unspoken trust underlies most of our interchanges. Effective social relations demand that the people involved can confidently expect their associates to behave in a certain way. You are more likely to get good behavior if you can confidently take it for granted that for the most part people will behave reasonably. Your confidence will be greater if your expectation is based, not only on a mere statistical probability, but on the student's clear-cut moral obligation. Reasonable behavior is something that the pupil owes to his classmates, to the school, and to the teacher. Violations of this obligation call for serious attention.

Try to discourage any connection between the pupil's obligation to behave and his liking for you. You want the pupils to like you, of course. And this does have a favorable effect on behavior and on his judgments of your disciplinary acts (Kounin and others, 1961). But this liking is important in its own right. If you use your good standing as a device to get good behavior, you cheapen the relation and may give the erroneous impression that the pupil has the obligation to behave only when he likes the teacher.

When you send a pupil to the principal, you run the risk of appearing to confess failure. And certainly this is a matter of last resort. Use it as such. But use it when really necessary. There are some infractions that really go beyond your jurisdiction, and the decisions about these should come from broader authority. In general, you should go as far as your skill and authority will permit you. But if these fail, and if a genuine disciplinary problem persists, don't just try to pretend it away. Good behavior on the pupil's part is more important than your feeling of success or failure. Your sense of failure, uncomfortable as it is, should not interfere with the need to take corrective action.

Discipline in Perspective: Résumé

Matters of discipline should not be swept under the rug, but neither should they dominate your thoughts. Many of the things you do to make your intrinsic instruction more effective, in any case, will also go a long way toward reducing disciplinary problems. Beyond these very general approaches, you may have to take some of the steps which have been described and which are directed more specifically to the problem of keeping order. Many disciplinary problems, like most other problems, are partially our own doing. But many come from conditions that we cannot control. Certainly there is no point in dwelling on our mistakes or nursing a sense of guilt. It is more wholesome to assume that for teachers, as for parents, life includes a generous exposure to unruly child behavior. We deal with this as we can, but we refuse to become so preoccupied with classroom control that we neglect the real purpose of teaching.

Summary

The group has an individuality and an influence somewhat apart from the influence of the individuals making it up. The classroom is a working group but it has more continuity than most working groups and is less clearly directed to a single task.

Sociometric relations within a classroom may be easily determined and portrayed, if desired, in a sociogram. When reasonable precautions are taken, data obtained in this way are fairly reliable and reflect real-life social linkages. Children shown to be popular in these assessments are somewhat brighter than the average and have at least average academic success. They are above average in appearance and emotional adjustment. They are sociable and come from sociable parents. They may talk much or little, but when they do talk it is about matters of general interest. Friendship choices show the influence of intelligence, interests, and home background. An older student can tell fairly well who likes him and who does not. He can also tell something of the general popularity of his classmates. Friendships are especially important to the child rejected at home. Rejection in the classroom is noted for delinquents and prospective dropouts. Teachers can do something to present the rejected child in a more favorable light. Within a group there is some pattern of authority, indicating who influences whom. Young children agree fairly well on the relative influence of their classmates. Other lines of influence can be detected by observing communication patterns (to whom do people address their remarks?). These patterns, once established, may remain fairly constant for quite a period. Because of his age and legal position, the teacher is likely to be a key figure in the authority pattern, but he can delegate or rearrange this temporarily if he chooses. He cannot, of course, legally abdicate his powers.

To provide a more accepting classroom climate, and to give children practice in group responsibility, and for other objectives, many teachers utilize group-centered teaching. In this arrangement, the group takes responsibility for many decisions, the teacher acting as consultant or as a member of the group. According to some views, the teacher is obligated to provide emotional support and is prohibited from sarcasm or personal derogation. From this approach there is some suggestion of improved attitudes and greater group cohesion, perhaps more independence. Mastery of subject matter is no greater or no less than in other approaches. Students vary markedly in their reactions. There is much to suggest that the teacher should choose his own approach and in so doing consider his own need for psychological distance. Good teaching and friendly support are possible in many approaches. The label "group-centered" includes several different things, some of which may help one kind of student and hurt another.

Groups have different appeals to different students, but within the group there are some predictable forces. On the one hand, there is a strong group pressure to induce conformity, varying in intensity, in the areas covered, and in the degree of unanimity on the part of the group. Immature people seem to thrive when conformity pressure is quite marked. As students become older they may be better able to resist such pressures. The brighter and more sturdy are more likely to resist or rebel.

The pressures differ with the size of the group. The small group is more permissive and more efficient in structuring an ambiguous problem. The large group is more efficient in the relentless detection of defects.

Leadership constitutes a twofold issue for the teacher. Leadership problems are present throughout daily work. The teacher also works to increase the pupil's skill in leadership. The person who automatically comes to exert leadership tends to be spontaneous, decisive. He contributes to the group by getting things decided and by advancing useful suggestions. The *de facto* leader may also be officially elected if he has the necessary friendliness and outgoing attitudes. The official leader has many unpleasant decisions to make and he may abdicate his responsibility because of this. The functioning leader faces the task of getting a representative decision, of collecting views to this end, and especially of encouraging the expression of minority views. If he has a clear idea of the decision he wants he can often use group pressures to promote that decision.

Training for leadership calls for a graded series of tasks to guarantee a reasonable series of successes, and a procedure for making the success apparent. To encourage general success in group work, the group should be assigned feasible tasks, and success should be made apparent or perhaps rewarded.

In spite of its probable emphasis on surface behavior, discipline is a problem that should be faced by the teacher. The management of discipline calls for more than pleasant-sounding clichés. Disruptive behavior includes (1) restlessness with compulsive talking, (2) hostile treatment of other students, and (3) resistance to authority. However natural, these activities should be discouraged. These problems are more pronounced when there already is stress in the classroom. Teachers successful in managing these problems are noted for their determined orientation to the task on which the class is engaged. They keep the class busily and effectively at work on this problem, doing many things to point out the partnership in this task. They treat infractions as obstacles to the task and not as personal affronts to themselves. Such an approach leads pupils to see both the teacher and the misdemeanor in relation to the objectives. Good disciplinarians avoid lulls or the appearance of helplessness. They exude a confident and pleasant manner and seek direct psychological contact with as many individual students as possible, but they are not necessarily chummy with students.

The effective disciplinarian gives the appearance of knowing what is going on ("withitness") and should be aware of class activities even while his attention is directed elsewhere. He goes to some trouble to show concern for the tasks facing the pupils. Some infractions can be conspicuously ignored. Serious distractions call for immediate attention, preferably by some informal, casual device that offers the least possible interruption to the task at hand. Moving closer to the pupil (proximity control) may serve. Intense or elaborate reprimands disturb other students (ripple effect). Reprimands and explanations should be kept separate. Genuine explanations should not include scoldings. Typically, when he must be reprimanded, the student knows his action is wrong. Lengthy explanations (overdwelling) are unnecessary and often intensely irritating. Elaborate formal inquiries should be considered for their training in judicial procedures. They have many disadvantages as disciplinary procedures.

The teacher should avoid giving the pupils the idea that he is prepared to bargain for their good behavior. Reasonable behavior is a moral obligation.

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16

Mental Health, Effectiveness, and a Sense of Worth

Most people have a fairly general notion of what is meant by mental health, and our use of the term fits in well with this general idea. There is little need for a more precise definition. In this preliminary discussion we hope chiefly to describe different approaches to the problem of mental health and to elaborate on some of its aspects.

Health as Freedom from Ailments

In one sense mental health, like physical health, consists of the absence of serious defects or mental ailments. This is often the approach of a physician who gives you a physical examination. He has a checklist of defects considered to be serious. Insofar as you are free from these symptoms or ailments you are considered healthy. In considering either physical or mental health, such a checklist would emphasize defects which produce distress or which interfere with the larger functions of the individual. In using this approach, moreover, we would pay little attention to defects which are inevitable, or which, presumably, are unavoidable (Scott, 1968). Many things—such as the first-grader's temporary shortage of teeth or the octogenarian's difficulties in going up the stairs—are clearly inconvenient and the occasion for distress, but would still not be regarded as illness. Such things are *normal.* Ill health implies a departure from the normal, or more specifically, an undesirable or troublesome departure from the normal. A full set of teeth in the octogenarian is unusual and might set us to speculating about possible causes but would not be regarded as pathological.

In the corresponding approach to mental health, we have in mind a number of feelings, attitudes, or ways of behaving which lead to distress or interfere with larger goals, and which are somewhat unusual—certainly not universal or inevitable. These conditions are abnormal in the sense that they depart from some norm or average. If our mental distresses are merely those typical of most people, we would be said to have reasonable mental health.

The Concept of the Norm In this approach, the "average," or *norm,* comes to act as an adaptation level. People close to this level bring no noteworthy reaction. People markedly below it would elicit our attention. In matters of health, mental or physical, this adaptation level, or reference norm, is not always a simple mathematical average. It is sometimes based on what would be expected *if nothing unusual had occurred.* Statistically speaking, the average number of fingers per person is probably somewhat less than 10. But 10 is the number we would have in the absence of accident (or rare genetic defect). And any departure from this number would be considered abnormal.

Health as a Positive Attainment

Even this modified norm or adaptation level strikes many people as being much too lowly to serve as an adequate criterion of health. You could meet this criterion and remain a placid vegetable or a contented cow, as Lazarus (1963) describes the state. To these critics, mental health is more than this negative business of avoiding the evils that keep us from being average. Mental health should not be measured by the evils we avoid, but by the positive steps we take toward our true potential. In this view, descriptions of the healthy person are almost descriptions of the ideal person.

Rival Claims of the Two Views

Neither view is to be lightly dismissed. When crippling ailments confront us they carry tremendous urgency and for a time will outweigh more exalted long-term needs. The severed artery must be treated, whatever the life that might await the victim on his recovery. True enough, sheer recovery takes our charge only part of the way that he ought to go, but it is an essential step and we should not ignore it.

The Difference Between the "Negative" (Minimal) and "Positive" (Enlarged) Aspects of Mental Health at Various Stages of Development

	Kinds of Adjustment Apparent in Childhood		
	Immediate Behavior of the Child	*Long-range Adjustment of the Child*	*Adjustment Expected of the Adult*
Minimal Concept (Mental health considered as the absence of illness)	*Freedom from Incapacitating Symptoms*	*Good Resistance to Stress*	*Absence of Mental Disorder*
Enlarged Concept: (Mental health considered as attaining positive values)	Enjoyable experience in day-to-day relation with self, family, others	Potential for effective, happy, zestful, creative childhood	Capacities for competent, happy, zestful, creative, responsible adulthood

SOURCE: M. B. Smith, Mental health reconsidered: A special case of the problem of values in psychology, *American Psychologist,* 1961, **16,** 299–306.

There is much to be said for the emphasis on the positive approach (Lazarus, 1963; Smith, 1961). Mere absence of disease does little to stir the imagination. The important thing is what you do with your health when you have it. It is possible, moreover, that this positive approach, or some aspects of it, is necessary for the more limited goal of merely avoiding illness. Illness is most likely to be avoided, perhaps, not by those who consciously seek to avoid it but by those who throw themselves into some engrossing activity much bigger than themselves.

The Problem of Disagreement Against these very proper arguments we must place the problem of disagreement. Everyone agrees that illness is an evil. But not everyone agrees about what you should do when you are well. One of the evils of illness lies in the fact that it limits our freedom of choice. In the views of some theorists, indeed, this freedom of choice, or lack of it, is not only one feature of mental illness, but the most critical feature that distinguishes mental health from mental illness (Bower, 1962). As soon as we correct this evil, however, and attain greater freedom of choice, we automatically invite a measure of disagreement. When we are well, there are many different things we can do, and different people will have different ideas as to which of these things is most desirable. All in all, we will experience almost universal support when we attempt the very important task of trying to reduce the amount of serious mental ill health. We may, however, encounter legitimate objections when we begin to specify the positive attributes of mental health.

The Emphasis on Competence In many statements of the positive view of mental health, there is much emphasis on competence or effectiveness (Scott, 1968; Jahoda, 1958). To some extent this emphasis on competence or effectiveness refers more to attitude than to skill or final success. We would not consider a person mentally healthy unless he directed himself purposefully toward one goal or another and showed some evidence of striving or of application. In this usage, a grand failure or minor bungling would not be inconsistent with sound mental health. From other statements, however, we get the impression that adequate mental health calls for skill and success as well as effort and application.

Insofar as the notion of mental health reaches out to include the more detailed types of skill, it comes to embrace the whole curriculum of the school. Competence, in this sense, is the school's function. Such aspects of mental health are treated in the discussions of leadership, creativity, problem solving, and the whole range of academic achievement. From our consideration of transfer of training we would, however, distrust the notion of competence as a single, all-embracing ability. Often competence as it is developed must be tailored to the specific goals. And in deciding to provide competence for one area (a life of political activism or a career in business management) but not for another (a life of solitary meditation or a career in political assassination), we implicitly take a stand on the merits of different objectives.

Types of Mental Ailments

The avoidance of specific ailments may not be the sole objective of mental health, but it is one legitimate objective. Since many of the positive aspects of mental health have been discussed in other chapters, this more limited objective will receive much attention at this point.

Denial or Distortion of Reality One conspicuous feature of mental ill health is a distorted view of important facets of the world. In extreme cases, the victim may believe that he is Napoleon or that his neighbor is in a conspiracy with men from Mars. At a less dramatic level, the person may refuse to face his own hates, or fears, or offbeat desires. Some such moderate denials or distortions are, of course, quite typical. As a matter of fact, there may even be some advantage in temporarily turning our backs on some of the more unbearable pressures. A persistent and stubborn blindness, is, however, quite another thing, and is properly considered as a characteristic of mental trouble.

Unusual Difficulties with Anxiety Anxiety in and of itself is no mark of mental ill health. Under conditions of objective danger, lack of anxiety would, in fact, suggest an unhealthy refusal to face the reality of the situation. Under these circumstances, *reality anxiety*, as it is termed, would be normal. It is only when such anxiety seems out of proportion to the menace that we consider that something is wrong. *Neurotic* anxiety is, however, a different matter. This is the anxiety that prevails when there is no objective threat at all. The victim quails before some vague, unknown terror or he sees a tremendous menace in things that most people would regard as harmless. Such neurotic anxiety, as the label implies, is unhealthful in and of itself. Moreover, if it brings prolonged and serious distress, it may also bring into play one of the well-known *defense mechanisms* by which people systematically delude themselves.

The Classical Veneration of Self-Control

They that have pow'r to hurt and will do none,
That do not do the thing they most do show,
Who, moving others, are themselves as stone,
Unmoved, cold, and to temptation slow,
They rightly do inherit heaven's graces
And husband nature's riches from expense;
They are the lords and owners of their faces,
Others, but stewards of their excellence.

SOURCE: William Shakespeare, Sonnet 94.

Difficulties with Self-Control Lack of self-control has long been identified with poor adjustment. Indeed, at one time such self-control was regarded as the key test of emotional adjustment. A man with little control was at the low end of the scale. The man with much control was to be envied.

The contemporary view is by no means that simple. Overcontrol may be as crippling as no control at all. But we are still concerned with the problem of self-control (Fraiberg, 1959). Mental ill health may be associated with both the amount of control maintained and the type of the control that is used. Certainly, wholesome control does not lead to the elimination of basic drives. On the contrary, the wholesome personality is endowed with strong urges or drives. The happy, admirable person is well equipped with vigorous appetites and a full quota of needs. Some of these needs may act in relatively primitive form. Others may appear greatly modified. In either case, however, these drives still exist and for the most part constitute a considerable source of satisfaction. The happy and effective person has a rich emotional life. He has enthusiastic likes and loyalties. He may have equally vigorous aversions and dislikes. All in all, he is distinguished from his less fortunate colleague, not by a dearth of natural drives, but by an abundance of them.

The need for some control has also been clearly recognized. We have no use for the man who gives out with violent attacks or a flood of abuse at the slightest interference with his activity. We regard him as unsocial and immature. But we are also reluctant to approve the man who has controlled his aggressive tendencies to the point of complete suppression. Ordinarily we do not admire the man who lets people walk all over him, who never talks back, or who never protests unfair treatment.

In a proper balance between drive and control there should be evidence of a happy and spontaneous energy. The balanced individual goes joyfully and zestfully to his task. He does not move reluctantly before a nagging conscience, nor does he rush ahead in frenzy as if to escape some fearful panic. If the control is efficient and not too restricted, there is breadth and smoothness to his actions. He takes minor obstacles in his stride. He gives major obstacles the attention they deserve and no more. The balanced person is strongly oriented to the present. He is not overpreoccupied with fighting yesterday's battles or in fearing tomorrow's hypothetical problems. He faces the foreseeable problems and takes steps to meet them. He tends to dismiss the more remote possibilities or to give them little attention.

Inadequate Relations with Other People Social relations are related to mental health in at least two ways. First of all, to avoid ill health, we must have made some kind of adjustment to other people. We may avoid them. We may embrace them. But we should have worked out some approach that does not bring us too much distress. Second, our relations with other people often cast some light on other aspects of adjustment. They serve as an index by which other facets of mental health may be observed. Such relations may show whether or not we distort the world that confronts us, or may show how comfortable we feel about ourselves.

Inability to accept necessary help is often an indication of trouble in basic social relations. To feel threatened or embarrassed when such help is offered marks us as being disturbed in this area. This also holds for inability to accept praise or commendation in graceful fashion.

Typically, when our relations with others are in a happy state, we are not unduly plagued by a feeling of always being misunderstood. True enough, very few people may ever feel that they are completely understood. But under wholesome conditions a modicum of misunderstanding is accepted as the price of individuality, and is not resented or considered an intolerable situation. Certainly it does not become an obsession or a major source of unhappiness.

Excessive criticism of others, like the obsessive feeling of being misunderstood, may also be a sign of basic insecurity. The emphasis is, of course, on "excessive." Complete absence of critical feelings about others, far from being reassuring, would probably indicate that such feelings were being deliberately suppressed. Excessive concentration on the shortcomings of others, however, definitely suggests a basic uneasiness about one's self.

Inadequate social relations are also suggested by undue dependence on others either for help or for moral support. We feel some worry about the man who is completely *other-directed* and who is never willing to swim against the stream. Ordinarily we should see how we differ from others, without feeling that this difference makes us outcasts from the group. We must also face genuine disagreements when they arise and face them with equanimity—without feeling the necessity of glossing over the differences and without feeling unduly threatened by such disagreements. To retain our own individuality, we must often be prepared to resist the efforts of others to dominate us if this domination appears to be going too far. Here there is an especial need for a fairly delicate balance. It would never do to be overly suspicious and to see any argument as an attempt to coerce us. Yet there must be some point at which we will resist coercion.

Indications of Positive Mental Health

In describing some of the mental conditions to be avoided, we have, by implication, also roughed out many of the ideal opposites of these deficiencies. At this point we turn our attention more directly to these positive attributes, reemphasizing some of the suggestions made earlier.

A Positive View of the Self The child's feeling about himself should be based on a view of himself that is reasonably free from distortion. The typical child will not, of course, have a detailed picture of himself. He should, however, have some general notion, and the notion he does have should not be too far from the objective truth. Young men judged to be healthy and emotionally mature have a picture of the self which is in fair agreement with the view of close friends (Heath, 1965). The healthy child should feel confident about the possession of his good points—his height, his popularity, and his skill with his bike—and confident that these abilities will serve him adequately (Nardine, 1971). He must also recognize the significant traits that give him some concern—his poor eyesight, his fear of rough-and-tumble games, his tendency to stammer.

From the time he first becomes capable of seeing these strengths and limitations, he should see them in perspective. He must see that his good points, accompanied as they are by inevitable frailties, will open no magic doors. His limitations, however conspicuous, must be seen chiefly as minor aspects of a person who is basically deserving of esteem. Indeed it is only in the light of his basic worth that his defects become conspicuous. Were he less admirable they would attract no attention. As his growing cognitive powers give him a clearer and clearer picture of himself, he must continue to see his attributes in their proper relation to each other—delighting in his virtues, but not magnifying them; recognizing his defects, but not dwelling on the very real distress they bring; seeing both virtue and defect as features of a self whom he can like and who has much claim to be valued by others.

Obviously, self-acceptance has an intimate relation to freedom from distortion. The person who likes the self he sees, in spite of the admitted quirks, has less need to distort the picture that is there. When the person cannot like the self that is tainted by such defects he may be driven to deny the defects or to gloss them over into some unrealistic image. A reasonable amount of self-liking is one of the conditions which permits us to face our limitations openly and honestly, and thus to make realistic decisions regarding any matter in which those frailties may play a part.

In this important matter of admitting liabilities, by the way, we must be careful not to go overboard. To dwell on one's faults endlessly and in seeming enjoyment, even to oneself, is a mark of poor adjustment. It suggests that the person is fascinated by his inadequacies and, in his own mind, is transforming his very unworthiness into a way of life. If he should spend much time in telling other people of his defects, they would suspect him of fishing for compliments.

Many people would insist that to attain true mental health we must not only like the self we find, but we must also see in that self some evidence of consistency, integrity, or style. A helter-skelter collection of traits or qualities would not do. The traits must fit into a pattern or unity that makes each of us an integrated individual. Among young adults judged to be above average in positive mental health, the self-concept is not only well organized but is fairly stable over the years (Heath, 1965).

Striving Toward a Confident Mastery One of the attributes of positive mental health is that of commitment and striving. According to this criterion, the healthy person does not merely avoid evils and handicaps, nor does he deal with them by simple retreat. He mounts a vigorous counterattack and seeks to master these features of the world, often trying to turn them to his own advantage (Nardine, 1971). As he gains a measure of success in these enterprises, he gathers *confidence* in his ability to master other problems. And this confidence, coupled with the disposition to try, and coupled also with a reasonable degree of competence or effectiveness, is considered one of the hallmarks of the person with vigorous mental health. With such confidence, realistically based on moderate success, the healthy person is free to take the risks necessary for growth toward further maturity.

Specific Positive Goals The various psychologists who put forward the goals of positive mental health have, in total, proposed a long list of desirable attributes.

The Self-Concept in Relation to Race, Sex, and Age

Some 80 children were given a test to reveal negative self-concepts. The mothers of these children were on welfare and the fathers were absent. There were equal numbers of boys and girls, black and white, younger (grade 1) and older (grade 5). There were 10 children in each of the eight subgroups. In the test, the child rates himself on 7 traits: smart, happy, well-liked, brave, attractive, strong, and obedient. A five-point scale is used for each trait, and a stick figure appears at each end. The child hears a story about each of these figures and is then asked to show where he stands on the scale. The scale is scored in terms of the number of negative self-concepts indicated.

Number of Negative Concepts About the Self

	Black		*White*	
	Boys	*Girls*	*Boys*	*Girls*
First Grade Boys	9.6		8.2	
Girls		15.0		9.3
Fifth Grade Boys	14.3		15.6	
Girls		18.2		16.6

The following differences were significant: black vs. white for first-grade girls; fifth grade vs. first grade for black boys; girls vs. boys for black children.

SOURCE: Thomas R. Carpenter and Thomas V. Busse, Development of self concept in Negro and white welfare children, *Child Development,* 1969, **40**(3), 935–939.

Assembled in one place (see the box, "Indicators of Superior Mental Health"), these constitute a formidable set of criteria. It would seem that we would need, not one, but several different paragons to encompass all these virtues. They include the cognitive and academic objectives of the school as well as those stressed in the discussions of creativity, socialization, and group relations (Scott, 1968).

Mental Health, Character, and Morality From the overall descriptions of positive mental health, we might well conclude that the healthy child is the "good" child. This, of course, is precisely the view that was strenuously challenged during the first part of the century. These protesters admitted that adequate mental health called for a reasonable degree of socialization and sensitivity to the needs of others. But they denied the converse (Block, 1962). They held that

Indicators of Superior Mental Health

Adaptiveness and Flexibility
  Includes ability to deal with the world, to specify objectives, and to carry them out, being guided by the results of the efforts.
Capacity to Gratify One's Needs
  Spontaneous action in the relaxed enjoyment of life. Sexual capacity. Ability to work for one's own interests.
Competence and Goodwill in Dealing with Others
  Taking part. Productive: meets responsibilities in a manner approved by others. Commitment to others. Ability to accept help. Trust and liking for people. Capable of intimacy. Warm, empathetic altruism.
Intellectual Ability
  Accurate perception of reality and of self. Ability to solve problems. Rational, much common sense. Broad, comprehensive view of life.
Emotional Control
  Able to handle anxiety and frustration. Moral and conscientious. Courageous. High morale.
Autonomy, Productivity, and a Sense of Worth
  Takes initiative. Self-reliant in making contributions. Emotionally independent, detached, strong sense of identity, and feeling of self-determination. Confidently seeks self-actualization. Sense of achievement and self-respect.
Integration and Equilibration
  Maintains balance and consistency in dealing with opposing forces. Mature, unifying view of life. Gives impression of maturity.

SOURCE: William A. Scott, Conceptions of normality. In E. F. Borgatta and W. W. Lambert (eds.), *Handbook of Personality Theory and Research* (Chicago: Rand McNally, 1968), pp. 974–1006. (Abstract is considerably reorganized and abbreviated.)

social decency is one feature of adequate emotional health but that it is no guarantee of such health. A man could live an exemplary life and fulfill his personal and social obligations in a superior way, and yet be plagued by inner distress and feelings of guilt that had no basis in the world of reality. Whatever his virtues and creative achievements he would not be considered to possess mental health. This protesting view is now being challenged in turn. Writers such as O. H. Mowrer maintain that mental illness is basically a defect in morality, a lack of complete socialization (Peterson, 1967).

The Prevalence of Maladjustment

Naturally, in their actual performance, most people would fall short of the objectives set forth by the proponents of positive mental health. Such objectives are ideals to strive for, not pragmatic checkpoints to be attained. Moreover, viewing mental health merely as the freedom from serious specific defects, we find that many people fail to reach even this more modest goal. Mental ailments of one kind or another are highly prevalent. In one densely settled section of Manhattan, for instance, only 18 percent of people were free from worrisome defect, and about 50 percent of the population were judged to need psychiatric attention. This, of course, is a crude average. Older people were much worse off, younger adults somewhat better. As is typically the case, the prevalence of such psychiatric trouble is much greater in the lower socioeconomic groups (Hollingshead and Redlich, 1958). Among younger adults in the New York study, the percentage of people considered "well" dropped from 24 percent for the upper social class to 10 percent for the lowest. For about 8 percent of people, these troubles become so serious that the person is referred to a clinic. This figure is about the same as that observed during World War II, when about 6 percent of selective service registrants were so seriously disturbed that they were rejected for military service.

Over the years, the reports for schoolchildren have resembled those for the general public (Kaplan, 1959). From their summary of earlier studies, Glidewell and Swallow (1968) estimate that about 35 percent of all elementary school children had some worrisome difficulties, and that one student in ten should have clinical attention. This latter estimate also holds for the college level (Farnsworth, 1961).

Viewing mental health, for the moment, as the avoidance of specific ailments, we now look at the responsibilities of the classroom teacher. First of all, we hasten to point out, we are not looking at the teacher too sternly or in an accusing manner. Fortunately, in recent years, there has been less tendency to blame the teacher for all the mental ills of pupils (Morse, Finger, and Gilmore, 1968).

Limitations to the Teacher's Responsibility

As teachers we have many sobering responsibilities in the matter of mental health. But there are distinct limitations on the things we should be expected to accomplish (Allinsmith and Goethals, 1962). In the first place, we constitute only one of many forces that act on our students. As might be expected, we will see only a small fraction of the events that strongly stir the emotions or that set off intense frustrations. Such experiences are much more likely to occur in the home or in the playground (Fawl, 1959). The typical thwarting that we must impose seldom induces serious emotional stress. Emotional upsets, when they do occur, must be attributed to many factors, and can seldom be charged to a single act on the part of the teacher. Some children may experience only a dozen upsets during an entire waking day. Others, encountering much the same experiences, may have ten times as many (Barker and Wright, 1954):

Above all, we should not permit ourselves to be overwhelmed or devastated by any single episode or short series of episodes. The temper tantrum or retreat to babyishness that we observe today does not mean mental disaster for the student. Turmoil and frustration are the order of the day. Most people surmount these feelings. Even a prolonged lack of adjustment, although serious in its own right, must not be given too much significance. Such continued lack of adjustment is a serious school problem, but it does not necessarily betoken poor out-of-school adjustment. Many children who show symptoms of maladjustment in the schoolroom will seem perfectly normal and well adjusted in the home or in the out-of-school gang (Harris, 1960).

There is also a question of whether or not maladjustment in one school grade is indicative of maladjustment in later grades. In general there is some constancy (Westman and Ferguson, 1967). On the average, the children who are seen to have problems in nursery school tend to have problems throughout the grades. This only holds on the average, however, and many individual children who seem disturbed in grade three will seem perfectly normal when they reach grade six (Harris, 1960). A persistent pattern in grade one might threaten trouble in the grades to come. A few disturbing episodes, however, might mean very little for the future. In school and in the home (MacFarlane and others, 1954) children pass through these trying episodes and regain something approaching normal adjustment.

Referral Functions

For children who are already disturbed, the teacher's primary responsibility is that of referral. Systematic therapy is not something that we would undertake on our own responsibility. Such therapy is no job for the amateur, no matter how well intentioned. Many children in trouble are already hiding from some unacceptable menace. In a clumsy attack on the child's ostensible defenses we may drive him behind even more impregnable barriers, thus complicating the task of the professional therapist. True enough, there may be a danger of overemphasizing the sacred realm of the therapist, clearly marked as "off limits" to the ordinary mortal. Therapists themselves frequently point out that treatment is not the exclusive concern of the clinician (Bower, 1968), and many clinicians will seek the intelligent cooperation of the teacher. But in such cooperation we follow the lead of the specialist.

Sensitivity to Important Problems In some school systems there may be systematic screening to detect children in need of clinical attention (Bower, 1969; Lambert and Hartsough, 1968; Lambert and Bower, 1961). In most classes, however, the teacher's referrals will stem largely from casual observations. The teacher will notice, and may report, types of behavior he regards as serious. How sensitive is the teacher to problems that really matter?

The early studies suggested that teachers and clinicians were very far apart in their views of worrisome behavior. Teachers were concerned about aggressive, moral, and acting-out behavior (lying, sexual activity, fighting). Mental hygienists were more alert to evidences of withdrawal or excessive timidity. In the more recent studies (Ziv, 1970; Toler, Scarpetti, and Lane, 1967), a gap is still there, but it has been reduced. Teachers, especially experienced teachers, see much danger in withdrawal, although they still attach more significance to disciplinary problems than do the clinicians. They also worry about intense displays of emotion. Younger teachers may worry about such frequent things as becoming confused under stress, fingering the mouth, or crying. Experienced teachers do not see these things as serious symptoms.

In learning about these discrepancies, by the way, we might be tempted to feel sorry for the poor misguided teachers. This attitude would not be justified. It is natural and wholesome that teachers should be oriented to the academic task to be accomplished. Pendulum swings within the field of mental hygiene itself, moreover, may show that, in some of the disagreements, the teachers may have been right and the clinicians wrong. From the point of view of later adult adjustment, excessive acting-out should be considered as a serious symptom (Lewis, 1965). And if mental ill health is to be equated with inadequate socialization, the disruptive behavior that worries the teacher would be considered very symptomatic indeed.

Aspects of Maladjustment Altogether, in wondering whether or not a child should be referred for clinical help, the teacher might well look for excesses in a number of areas—incessant and unprovoked fighting, unprovoked screaming, unusual defiance, and certainly unusual dependence on fantasy, or excessive timidity or withdrawal. Excess can take several forms. Frequency would certainly be a factor. An occasional outburst, however unfortunate, might be overlooked. A series of frequent outbursts in contrast would cause some concern. The undesirable behavior could also be excessive in its duration. A brief period of depression is one thing; a depression that persists over weeks, quite another. Sheer intensity of expression, especially if frequent or sustained, may also brand behavior as excessive.

Terms such as "unusual" or "excessive" can have meaning only by reference to some standard or norm. Ordinarily this norm is the typical behavior within the age group. A succession of temper tantrums might lead us to worry about the adolescent, but perhaps not about the two-year-old. In making judgments about excessive or unusual behavior we would also be influenced by the provocation or circumstances. Protracted grief might be appropriate to the loss of a pet, but not to the loss of a football game.

Whatever the underlying reason, the reaction of other children may point to the child in trouble (Bower, 1962). Systematic avoidance or rejection is frequently predictive of emotional problems in the child himself.

Responsibilities Following Referral At times the teacher's immediate responsibility ceases with referral. A severely disturbed child may be transferred to a special school, and there is some evidence (Vacc, 1968) that this may be an advantage. A child with a moderate disability may receive counseling from some specialist with no detailed involvement on the part of the teacher. At other times, however, the teacher will take part in a cooperative program chiefly under the direction of a specialist. Many teachers, by the way, find it rather difficult (Bower, 1968) to harmonize the specialist's requirements for this one child with the persisting requirements of the class as a whole.

Dealing with Classroom Stresses

Apart from his occasional cooperation with a specialist, the teacher's role is supportive rather than therapeutic. Rather than attempt intensive therapy for those already in trouble we should concentrate on providing a general atmosphere that will encourage wholesome adjustment (Allinsmith and Goethals, 1962).

Keeping Tension Within Bounds

Some tension within the classroom, of course, is inevitable. Many academic tasks are demanding, and must induce some strain. Interpersonal relations are bound to be stressful under some circumstances. Tension in moderate doses is not only inevitable but may be useful for physical well-being. Richter (1959) suggests that in our current civilization we are paying for our relative absence of stress by increases in arthritis and similar ailments. However that may be, many people realize their full powers only when under considerable tension. And, in actual fact, a certain amount of fear or anger can be pleasurable or exhilarating when allowed fairly free expression.

It is excessive and unremitting stress that leads to maladaptive behavior. When there is stress which the pupil cannot hope to cope with, we may have to remove him from it for a time. Typically, however, we hope to take care of these problems by keeping the tensions at a moderate level.

In teaching for mental health, the attempt to prevent excessive stress can never be the whole story. Ultimately the child should learn to deal with the many kinds of tension that will be inevitable in his life. It is only gradually, however, that he acquires skill in dealing with these tensions. Until he has acquired that skill, we should try to protect him from stress or frustration that is too severe for him to handle. This protection is demanded by simple humanity. It would seem needlessly cruel to ask the child to face problems that are beyond his power now, but which, either through maturation or learning, will be well

Attempting To Relieve Examination Stress

Women college students in five classes took part in this experiment. At the beginning of the term all students (152) took the Manifest Anxiety Scale. At the time of the first test, each class was divided into an experimental (comment-invited) group, and a control (comment-prohibited). The test was of the multiple-choice type. Beside each question there were some blank spaces. For the comment-invited group, the instructions said, "Put an X through the best answer for each item. Feel free to make any comments about the items in the space provided." The others were told to mark the right item but not to make any marks in the space provided.

If there is any help from freedom to make comments, it should show up toward the end of the examination. When all classes were grouped together, the comment-invited group did show a superiority on the second half of the examination.

Students for one class were divided into those above the median in general anxiety (Manifest Anxiety Scale) and those below the median.

The table shows the number of *errors* made in each half of the examination.

	Average Number of Errors	
	First Half of the Examination	*Second Half of the Examination*
Students High in Initial Anxiety		
Comment-invited	9.6[a]	7.2[a]
Comment-prohibited	9.0	8.8
Students Low in Initial Anxiety		
Comment-invited	7.2	7.4
Comment-prohibited	8.4	6.8

[a] The difference between these two scores is significant. (The report does not say whether or not the difference in the last line is significant.)

SOURCE: A. D. Calvin, F. J. McGuigan, and M. W. Sullivan, A further investigation of the relationship between anxiety and classroom examination performance, *Journal of Educational Psychology,* 1957, **48,** 240–244.

within his capacity a few years hence. Apart from the immediate considerations of kindness or humanity, moreover, this moderate protection may also prevent some desperate plunge into self-deception from which there is no easy turning back. Finally, such partial tempering of the harshness of reality is an essential factor in the learning process itself. Competence in dealing with tension, like competence in most areas, comes from a series of successful performances, and from the reinforcements they bring. To achieve such a series of successes, we must try, when it is within our power, to make sure that the early experiences with tension are not too difficult to cope with. Fortunately, in carrying out our humane urge to provide protection, we are also, for a time at least, helping to carry out our sterner resolve to develop skill.

Structuring the Experience of Tension To be tolerable or enjoyable, the menace or tension should be clearly structured. It should be seen as being limited in the area that is threatened. It is not too difficult to deal with the threatened dunking in the lake if that is all that is at stake. Often danger may be faced without too much strain if it threatens only the person himself and not his family, or if it raises the possibility of an injury but offers no serious threat of loss of status or self-respect. Even when there is a threat to self-esteem we can often help the student to see that this serious threat has its limits.

Tension is also more likely to be pleasurable or tolerable when it is perceived as being clearly temporary and having a fairly definite end point. The truth in the saying, "This, too, will pass," is too often overlooked in the midst of trouble, and the underlying truth, if not the saying, can bear repeating. Tension may be pleasurable when we know that the contest will end and that the trying expedition is scheduled for only a limited time. The stress or urgency is less tolerable when, far from having the appearance of a brief emergency, it threatens to continue on and on indefinitely.

Tension or arousal is often reported to be pleasurable or exhilarating when it is seen as a challenge that calls for all our new-found energy and our skill. The glow comes from a challenge that we have a chance to master, but which will demand all that we have. To transform the experience from a hideous menace to an acceptable challenge, we may merely need to remind the student of existing talents that he may have overlooked in the midst of his panic. A student quailing before the prospect of an oral report to the class could be reminded of his skill in photography and of the possibility of using slides. If the skill is actually lacking, we may be able to help the student acquire it. The smaller boy, in terror of the school bully, for instance, might consider lessons in boxing or junior karate.

Permissible Expression of Emotion A worrisome drive brings less tension and unpleasant stress when it is granted wholehearted expression. Fears that can be expressed in headlong, unashamed activity, such as a wild flight from a forest fire, may bring a feeling of exhilaration along with the very somber experience of danger. Contrived dangers, such as those found on roller coasters, often bring very intense fear, but the game calls for wholehearted expression of the panic, and the whole experience is somewhat thrilling. For some people, anger freely expressed in a quarrel or brawl is also pleasurable and may be deliberately sought.

Notice that many expressive actions do nothing to alleviate the actual situation. The shrieks do not stop the roller coaster. Tears do not bring back the dead. But even such nonadaptive behavior often has the power to make tension more endurable. People in the throes of terrific fear, as when civilians sit huddled in a bomb shelter, find some measure of relief in merely talking about their fears. The same thing is often true of hostility. Describing your anger may reduce your feeling of aggression. For young children, uninhibited crying provides a useful expression of emotion. Conversely, a child persuaded not to cry on the occasion of receiving one hurt may cry all the more frantically later on if he should receive a second injury.

Absorbing Student Hostility

It would be a most unusual teacher, and perhaps an ineffective one, who did not encounter some marked feelings of hostility on the part of his students. What should he do about it? We have suggested that the more the students are permitted to express this hostility, the easier it will be for them to deal with their feelings in an adequate manner. But might there be some practical difficulties? And, anyway, are we asking too much of the teacher?

If he himself is to face reality in mature fashion, the teacher must face the fact of hostility when it occurs, and must not try to disguise it. On the other hand he should not take it too seriously. He should structure it and see its limits. Remember that not all of expressed antagonism is directed to you as a person. Some of it, of course, may be. Most of us can expect to find that some people dislike us for what we really are. Much of the resentment you encounter, however, will come from the things you must do in the performance of your duties (Musgrove, 1964). It would be directed to anyone carrying out the same functions. A very large portion of resentment against the teacher, moreover, is merely an expression of anger with adults in general and with parents in particular. Especially about the time of adolescence (Symonds with Jensen, 1961) this hostility is the dominant emotion. Many adolescents regard teachers, parents, and bosses as undifferentiated authority figures (Musgrove, 1964). You, in your sustained contact with pupils, are likely to catch the full brunt of their generalized annoyance at adults. If you can absorb this undeserved, generalized hostility, you will be helping the students obtain some partial outlet for their disturbed emotions, thus making their anger easier for them to face (Ojemann, 1962).

In urging you to try to absorb this unmerited hostility in mature and adult fashion, we are by no means urging you to kowtow to it in abject surrender. Even though you preserve your equanimity, and even though you may see that this hostility has little to do with you, you may find it wise or necessary to pull the student up firmly, even sharply, if he oversteps the mark. A correction may be necessary, not only to express your own disapproval, but to provide the vindication expected by other students and onlookers, and to help the student in his own progress toward maturity.

Meeting the More Basic Needs

As we might expect, it will be easier for a student to handle any one stressful episode if he is not asked to deal with other serious tensions at the same time. Conversely, if he is already frustrated in his attempts to satisfy some vital, basic need, he will have trouble in dealing with the frustration of some less primitive desire. We are asking for trouble, for instance, if, when the child is already tired and hungry, we expect him to accept in graceful fashion the postponement of tomorrow's picnic.

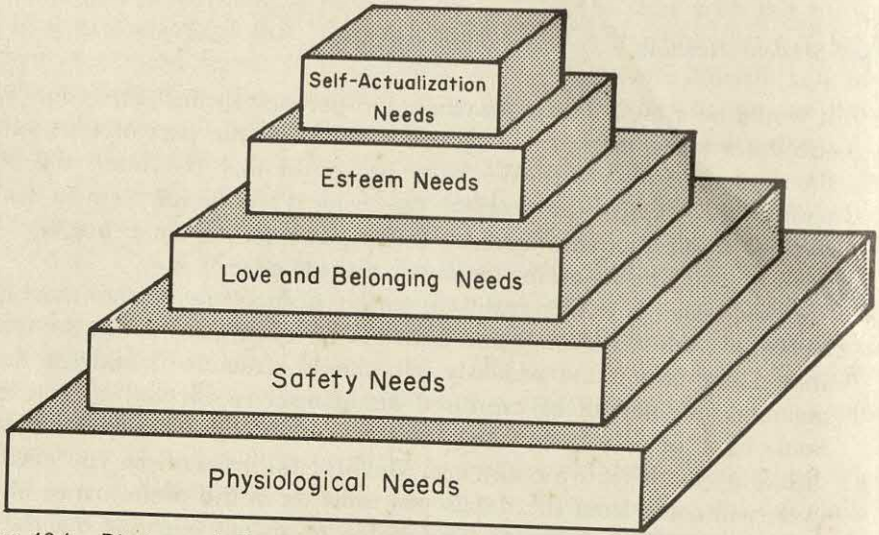

Figure 16.1. Diagram of the hierarchy of needs. From H. J. Klausmeier, *Learning and Human Abilities: Educational Psychology* (New York: Harper & Row, Publishers, Inc., 1961). Used with the permission of the publishers.

Maslow (1948) made much of the possibility that needs may fall into some sort of hierarchy, with the primitive needs at the base and with the more recent and deferrable needs superimposed (Fig. 16.1). In this hierarchy there are five levels of needs. Those having an A-1 priority are the physiological needs. Next on the list are the needs involved in avoiding danger or securing safety. Then there is the need to secure love from other people. One step beyond this is the need for esteem. For Maslow, esteem includes both the good opinion of other people and self-approval. It is only when pressure from these other needs is partially relaxed that the individual can get on with self-actualization—the final enterprise on which Maslow sets such store.

Throughout the hierarchy, any second-order need will be at a disadvantage in competing with a first-order need. A fairly strong urge toward artistic creation, for instance, might be ruled out by a weaker but more primitive need to avoid the contempt of others. A child should find it easier to manage the stress from unfulfilled creative urges, moreover, if he is not already wrestling with the loss of esteem. He will find it easier to look honestly at his lack of popularity if he does not already feel a lack of parental love. He can better handle a fearsome experience (the approaching hypodermic needle) if he is not already tired and hungry. And it is only when the basic needs have been satisfied to some degree that the student can hopefully address himself to the more ambitious goals of competence and achievement (Nardine, 1971).

Pupil Personalities Preferred by Student Teachers

Student teachers (240 women, average age 23) were presented with sixteen stories describing fictitious boys and girls. The stories were constructed so that each one depicted a different set of personality traits, and showed the child possessing these traits taking part in a classroom incident. By the use of rating scales the teachers indicated how much they would like to have each child in class. They also rated the child on such things as probable achievement and generosity.

Teachers' Ratings of Fictitious Boys and Girls

	Desire for Child in Class		*Probable Achievement*		*Probable Generosity*	
Fictitious Traits of Child	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*
Independent, Active, Assertive	3.6	3.3	4.1	3.8	3.4	3.2
Dependent, Passive, Submissive	4.1	4.2	3.8	3.9	4.2	4.4
Flexible, Nonconforming, Untidy	3.7	3.6	3.7	3.4	3.5	3.5
Rigid, Conforming, Orderly	4.7	5.0	4.6	5.0	4.4	4.6

SOURCE: Norma D. Feshback, Student teacher preferences for elementary school pupils varying in personality characteristics, *Journal of Educational Psychology*, 1969, **60**(2), 126–132.

Providing Emotional Support The teacher, of course, cannot be the key person in helping the student meet the basic needs in such a way that he will be free to go on to higher-level achievement. The teacher can, however, do much toward providing the student with some of the esteem and affectionate regard so important to his well-being. The teacher's warm emotional support can help make the classroom a less stressful place and enable him to take the risks necessary for self-actualization.

Any teacher must get exceedingly weary of being told over and over again about the importance of warm emotional support. Annoyance becomes even greater when there is an implication that this is an easy matter to arrange, or that it will solve all problems. Neither implication is true. Sincere warmth and affection are not easily turned on at will. Very often, both principals and teachers find it easier to like and to support the typical middle-class child than his classmate from a lower-class home (Yee, 1970). It is easy enough to like and admire the capable and agreeable child. Very often, however, the children in most need of this support are not easy to like. If we follow our natural inclinations we feel the greatest fondness for children who are already fairly popular (Gronlund, 1953). Our preferences, moreover, soon become apparent to students and to any frequent observer (Silberman, 1969). When we do surmount these difficulties we will often find our efforts rebuffed. Try to be friendly with children who have experienced extreme rejection over a long period and you will find that your advances are met with suspicion and distrust (Redl and Wineman, 1951).

Although genuine love may refuse to come at your bidding, expression of esteem may be more susceptible to voluntary control. By watching closely, and by applying appropriate standards, you might find something you could sincerely praise in even the sorriest student. This praise need not be fulsome or sugary, and for older students especially, perhaps should not be. Frequent enthusiastic exclamations, interjected sincerely under reasonably appropriate conditions, would seem more natural and should be effective. A natural, spontaneous manner often suggests that the teacher likes the students and is happy to be with them. Direct and vigorous interchange can also carry the same suggestion.

Promoting Skill in Coping with Stress

In trying to develop the capacity to deal with stress, we often lack the precise control that we can expect in teaching academic subjects. In teaching the management of stress, for instance, we cannot always arrange for a graded series of tasks. In spite of our best efforts, the emotional problems faced by the six-year-old may be more serious than any frustration he may encounter in all the rest of his life. In this area of adjustment we may also lack the precise control over reinforcement that we can usually expect in teaching algebra or Latin.

Gradual Initiation to Stress Our control over stressful situations may be more complete in playground or extracurricular activities. In these areas we can exploit or engineer occasional stressful experiences that are within the capacity of the student and let him experience that positive joy of dealing successfully with the menace (Olson and Wattenberg, 1955). There is good reason to hope that in coping successfully with one stressful incident we acquire more competence to handle a similar or a more difficult situation (Klein, 1960). Successful exposure to an artificial, moderate stress can often make things easier for students when they encounter a genuine and serious threat (Torrance, 1958).

When the stress takes the form of fear, there is much to be gained when the child himself controls the task he must face, and when he is perfectly sure that the menace is completely under his control. When the student realizes that he can take as much or as little of the menace as he chooses, he can have no doubt that the threat can be kept at a level consistent with his skill. This would be true, for instance, if he knew he was free to withdraw at will to the shallow end of the swimming pool; if he could control the volume of the frightening sound; if he could, of his own will, move toward or retreat from the fearsome caged snake. If we are to maintain this arrangement, we must not even express disappointment when he retreats. But we can be quite effusive about his more resolute tries.

Systematic Training Programs So far we have discussed things a teacher might do in the course of the ordinary school day. The devices described are those that might be sandwiched in with lessons and with informal playground activity. It is possible, however, that these incidental techniques, important as they are, should be supplemented by a frontal attack and that we should organize classes frankly aimed at more adequate adjustment (Morse and Dressel, 1960).

One of the earlier movements in this direction was the work of Bullis (1953) and his colleagues in the Human Relations Club. In these classes there is much group discussion of interpersonal tensions, worries, and stresses. In such courses there is an opportunity to use films, books, and pamphlets suitable to students of different ages. In other approaches there has been some use of psychodrama, or role playing, in which students are asked to take a part in some play dealing with adjustment difficulties (Weinreb, 1953).

Ojemann (1961) reports a group of experiments in which students were encouraged to study social subjects from a "causal" approach—Why do people act the way they do? What are the deep, underlying motives of the nonvoter? Such students were better able to adopt a tolerant attitude, or a more objective attitude, toward the behavior of others, and were also considered more able to cope with the stresses in their own lives.

One recent approach, attracting a good deal of attention, is the Human Development Program of Bessell (1968). (See Evans, 1971, for a description of these and other programs.) Whereas the older programs were most suitable for students old enough to read and to discuss fairly complex concepts, the Human Development Program was started with preschool children; programs for older pupils are also prepared.

The program fits in with humanistic notions (Chapter 4) and especially with the views of Maslow. It is held that a child is not free to deal effectively with stress until he has partially met his more basic needs, and has overcome his fears in these basic areas. He should feel reassured about his safety, his acceptance by others, his access to help and support, and his own ability to handle many problems. To achieve these and other goals, the program stresses skill in *social interaction* (understanding and accepting others), in *self-awareness* (insight into one's own feelings and acceptance of those feelings), and in *mastery* (reasonable competence). Self-control and personal authenticity are also included.

Young children in groups of eight to twelve go in for intensive discussion of these topics under the guidance of the teacher. The rest of the class looks on from a "gallery" or from seats some distance from the participants. Each pupil is an onlooker on some days, a participant on others. The emphasis is not on the

Using a Formal Course To Improve Emotional Adjustment

Four classes of grade six pupils had been enrolled in a special course designed to increase the understanding of the causes of behavior, and to encourage pupils toward thinking of the reasons underlying behavior, rather than merely condemning or approving the behavior they observed. Some of the pupils had been in the special program for one year and the rest for two years. A control group of four classes had had the regular grade six program. For all pupils in the special program the average IQ was 105.9. For those in the regular program the average was 105.4.

Each pupil took the Children's Manifest Anxiety Scale, a Security-Insecurity Rating Scale, and a test designed to bring out the *discrepancy* between the pupil's concept of the person he thought he ought to be and the kind of person he thought he actually was.

	Number of Pupils	*Amount of Anxiety*	*Amount of Insecurity*	*Amount of Discrepancy Between Ideal and Real Self*
Regular Program	86	15.0	24.1	7.9
One Year of Special Program	53	15.5	24.0	8.0
Two Years of Special Program	45	11.9[a]	22.4[a]	7.2

[a] These two averages are significantly different from the averages of either of the other groups. No other differences are significant.

SOURCE: P. Bruce, Relationship of self-acceptance to other variables with sixth-grade children oriented in self-understanding, *Journal of Educational Psychology*, 1958, **49**, 229–238.

intellectual content of the ideas put forth but on the underlying feelings or emotions, and especially on the clear and adequate portrayal of those feelings. The feelings a child is trying to express are brought out and made explicit. There is some emphasis, of course, on finding terms suitable for that age level which would serve to express the feelings. Whether by providing support for more basic needs, or by other means, the program is held to free children so that they accept leadership, take on appropriate responsibility, and offer assistance to others. It is still too early to decide about the general effectiveness of the program, and certainly impossible to decide whether any benefits that do arise can be credited to such things as the seating arrangements, the intrinsic discussion, or the sustained attention given to the realm of feelings.

Promoting Positive Values

Although we can be of great service merely by reducing some of the mental ailments that might occur, we will also wish to help the student to push beyond mere absence of defect and to achieve the more ambitious positive goals of mental health. The steps to be taken in this more ambitious task, as we shall soon see, are by no means novel but often turn out to be very much like the procedures used to combat the specific ailments and also like the procedures advocated for general success in teaching.

Actualizing a Valued Self

One of the great positive goals of mental health, it will be remembered, is the attainment of a positive view of the self. This calls for a realistic view of powers and limitations. The limitations are seen in relation to the powers, and both powers and limitations are experienced as a compact structure of *expectancies* (McCandless, 1967). This structured, cognitive view of the self, once achieved, should bring a sense of satisfaction and quiet pride. In looking at the self, the student should see a person of worth, calling for liking and respect.

The student's self-esteem is important for the school in two ways. In the first place, it is linked with success in academic tasks. Students who enter school with a wholesome self-concept turn out later on to be superior in reading (Wattenberg and Clifford, 1964), more effective in group work, and in creative activity. They are also more curious and venturesome (McCandless, 1967). We cannot, of course, be sure about what is causing what. But a wholesome self-concept is certainly an index, if not a cause, of later achievement in other areas.

But the school has even a more intrinsic concern with self-esteem. The child's view of himself and his attitude toward that self must be largely determined by the successes and failures he has encountered, and by the reactions of other people to his performance. True enough, the approval and condemnations shown by the teacher are probably less important than those coming from the home. The child has clearly begun to feel esteem or shame by the time he comes to school (Wylie, 1968). Our reinforcements and disapprovals must also count, however, and perhaps we can do much to help the child see a more acceptable embryonic self, and to help him bring out and actualize the worthy features of the self he comes to see.

The Self-Concept and Group Membership The self which the child sees is clearly linked to the salient groups to which he belongs. To some extent, the cognized self *he comes to see* is made up of the ways in which he differs from other members of the group. When he thinks of himself as tall, or clumsy, or quick, he must base his perception or judgment on some adaptation level produced by the children he knows. She is tall only in comparison to other girls of her age. He is clumsy only in relation to his fellows.

Part of the child's self-concept comes from the things that differentiate him from the group. Part of it, in contrast, comes from things that identify him with the group. As a boy, he has privileges and opportunities not available to girls. A girl can expect an open display of affection seldom shown to boys. Part of the girl's self-concept comes from membership in a group thus favored. The regard a child feels for himself is partly derived from the regard he feels for his family, his race, his sex, and his gang. In failing to show the respect due to each of these groups we run the risk of diminishing the sense of worth of any member of the group. This is no mere theoretical possibility. During their progress from grade one to grade five, for instance, black children and white welfare children show a steady decline in self-esteem (Carpenter and Busse, 1969).

Hints from Parent–Child Relations Unfortunately there are few data which show just what a teacher might do to further this self-concept and to help the child actualize the best aspects of the self he is able to see. From studying the home background of children who have developed self-esteem, however, we can get some leads of the general factors which may play a part. True enough, we cannot be sure whether these background factors are the actual causes of self-esteem or whether they themselves are also effects stemming from a more fundamental cause. As it happens, however, the implications of these results call for practices which carry little risk, and which would seem to be desirable in any case.

When preadolescent boys showing much self-esteem are compared to those showing little (Coopersmith, 1967), we find that the parents of the two groups differ in several ways. In the homes of those showing most esteem we find, first of all, greater acceptance. This takes the form of simple expression of affection, greater concern over the problems as they are felt by the child himself, greater feeling of rapport, more participation in joint family activities, and greater availability of parents when the child is in need of assistance or support. The parents in these homes were also found to help the child get a clearer view of his own achievement. In the practical business of directing the children, these parents gave clearer and more structured accounts of the rules and parental demands to which the child must conform. The demands that were formulated by these parents, however, allowed wider limits within which the child was free to act. These less stringent, but clearly structured, rules were enforced consistently and firmly. In enforcing these rules, however, there was little use of corporal punishment or the withdrawal of love following some infraction. The parents of the children with low esteem, in contrast, attempted to manage the child's behavior chiefly by punishing undesirable acts, and only secondarily by rewarding any good behavior that might occur.

Whatever the precise causal role of these practices in the "better" homes the total picture is most reassuring. Indeed the results fit so neatly into our preconceived ideas that we may suspect them of being all too pat. In a world so complex—and so seemingly perverse—as our own, we might wonder if the complete answer lies merely in being affectionate, considerate, helpful, and firm. But even if things do not turn out to be quite that simple, we would lose little in attempting to make use of some of these idealistic practices to the extent that our human frailty will permit.

Competence and Confidence

Going beyond the general background which we hope will permit and further the development of self-esteem, a number of psychologists have suggested specific strategies for developing various aspects of the self-concept. Among these aspects, of course, competence and confidence are crucial (Nardine, 1971). The child's belief in his competence should be based on a real competence that he actually possesses. His resulting feeling of confidence is closely linked to self-esteem. These attributes, moreover, readily fall within the domain of the school. Competence, in many areas, is the school's business. And in the pursuit of that competence, confidence can be generated or destroyed.

For some children the outstanding classroom requirements call chiefly for the kinds of pedagogical skill discussed in Part II of this text. For other children, the classroom emphasis is on the development of attitudes and on the encouragement of maturity (Chapter 12).

Too many children lack both competence and confidence. They have experienced little success and are discouraged about the likelihood of ever succeeding. For them, the great need is to provide some experience of clearly recognizable success, however modest (Chapter 6). By setting feasible tasks, by behavioral shaping, and by generous guidance, we should try to see that these children succeed in something. With the completion of each attempt, we should point to any unmistakable success in a really challenging task, taking especial pains to bring out any aspects that might have escaped the child's notice. In these early stages of experiencing success we should provide positive reinforcement whenever there is any definite success attained (Chapter 6), and should positively reinforce *all* performances containing any hint of progress.

At the other extreme, the fortunate child, already on the way to both competence and confidence, requires a different approach. With this student we should, first of all, be careful not to impair the procedures that have already worked so well. Secondly, we might gently encourage him as he moves into the higher reaches of attainment (Chapter 8). Such a student, as it happens, often has a high need for autonomy. Our instructions and assignments should hem him in as little as possible. Even if we do structure our assignment in meticulous detail, he is almost bound to restructure it, perhaps simplifying, perhaps elaborating, perhaps merely organizing it along different lines. The structure that so intrigues us is not likely to be precisely the same structure that dominates his experience (Chapter 7). The detailed guidance relished by his less competent classmate will serve as a hindrance and irritant for this more fortunate student. As he begins his task, moreover, any guidance we do provide should be subtle, and at a distance, permitting much room for creative or original attacks (Chapter 8). In this approach we must be reconciled to the inevitable errors that will follow from the permitted freedom. We can be objective and blunt in evaluating his final production. All in all we can perhaps do most for him by arranging things so that he observes successful models in the arts of inquiry. These successful models may be found in historical description or even—who can tell?—in the person of the teacher himself.

For still other children the great need is for a more adequate socialization, or for a more realistic appraisal of themselves and their achievements. The child who performs well, but lacks confidence, for instance, often exhibits undue dependency. He constantly and actively seeks reassurance about the merits of productions—merits that may be quite obvious. To reduce this immature dependency (Chapters 12 and 14) we must continue to reinforce his achievements, but must try not to reinforce the tendency to beg for reassurance. Be busy with something else when he solicits your approval. Look for an opportunity to offer enthusiastic commendation before he gets a chance to ask for it. Written comments help in this respect. They provide commendation but do not typically follow an outright appeal for such commendation. Most important, perhaps, we can help him to detect the genuine merit of his own achievements. After listening to his disparagement of his own work, we can ask him to name some good points, then ask him to list some more.

We turn now to the child whose performance leaves much to be desired, but who is quite happy about what he does, and who blithely undertakes tasks far beyond his competence. In trying to reduce this discrepancy, we could concentrate on bringing his actual competence up to his own opinion of his worth; such an increase in performance, of course, is important in any case. To a great extent, however, our problem is to get him to face reality, and to see his achievement in more objective fashion. And we must try to do this without undermining his *basic* self-esteem. We must also try not to seem critical of parents and others who share his exalted view of his attainments, and who may have given him this unrealistic attitude in the first place. He should be convinced that he is a very worthy person, but should also realize that some specific performances fall short of the standard. There should be no attempt to show him up in a way that proves humiliating, or to shame him into modesty, tempted though we may be to try just that. It would be much better to focus on some of his better fields and to bring out, and vivify, the very genuine achievements in those areas. Using these prideful standards as a reference, we could then get him to look at his other less adequate performances. All in all, there should be heavy use of vivid, objective records which show some encouraging progress (hopefully), especially in some areas, but which also show the objective variation from one performance to another. Perhaps we can also arrange things so that he is required to analyze or portray these differences himself. In doing this it would be difficult for him to avoid seeing his achievement in some perspective.

Summary

Mental health has implied both the absence of specific ailments and the attainment of vigorous well-being. The concept of positive health is attractive, but invites disagreement about particulars. Mental ill health involves distortion of reality and anxiety over improbable dangers. It also includes inadequate self-control, or, at times, overcontrol, and trouble in relations with others (unjustified suspicions, excessive criticism, excessive dependence, or rejection of all dependence). Positive mental health implies self-acceptance and confidence in attempting new tasks. In some views, positive mental health implies better than average morality.

Serious mental ill health is widespread, especially in economically depressed areas, in persecuted minorities, and in the very old. Among schoolchildren perhaps 10 percent need some help. The teacher must combat specific ailments, but should not take the blame for all troubles. He is only one of the forces involved. In spite of some long-range constancy, most children have ups and downs in mental health. When on an upswing they should find the school a pleasant place. The teacher helps by referring troubled children to the specialist and in cooperating with the recommended treatment. It is important to be able to detect indications of withdrawal, or retreat, as well as the more obvious problems of misbehavior and aggression. The latter, however, is more indicative of trouble in adult life. Attention should be given to behavior that is markedly inappropriate, excessive, or unduly frequent or prolonged. Age and circumstances are taken into account.

Tension should remain within reasonable bounds especially for the immature child. Occasional transient tension can be a tonic. Steady, unremitting tension is to be avoided. Tension is easier for the child to manage when it is moderate and clearly structured, when the real evils are separated from incidentals, and when problems are seen in relation to abilities. Partial expression of an emotion, if feasible, may help. Talking about emotions is often useful. Such talk can lead to expressions of hostility toward the teacher. Although hard to absorb, some of this is directed to the adult world or authority figures in general.

The pupil can better endure frustration of higher-order needs (approval) when his lower-order needs (to be free from danger) are not also thwarted. Unfortunately the children most in need of affection and support may be the hardest to like. Some frustrations can be reduced by gradual initiation, by forewarning, and by the availability of relevant skill. There is some use of formal programs to help children understand emotions and feelings.

As a positive goal the student should see an attractive, potential self, and should set out to actualize this self. A wholesome self-concept is linked to successes encountered, to membership in a fortunate group, and parental respect, sensitivity, and availability.

When both confidence and competence are lacking, the emphasis should be on developing modest, but conspicuous, competence. When both are present, the teacher should press for greater achievement and creativity while respecting the need for autonomy. The competent, but hesitant, child should receive generous approval *before* he asks for it. The overconfident, but ineffectual, child should see both the worth and the limitations in his achievements.

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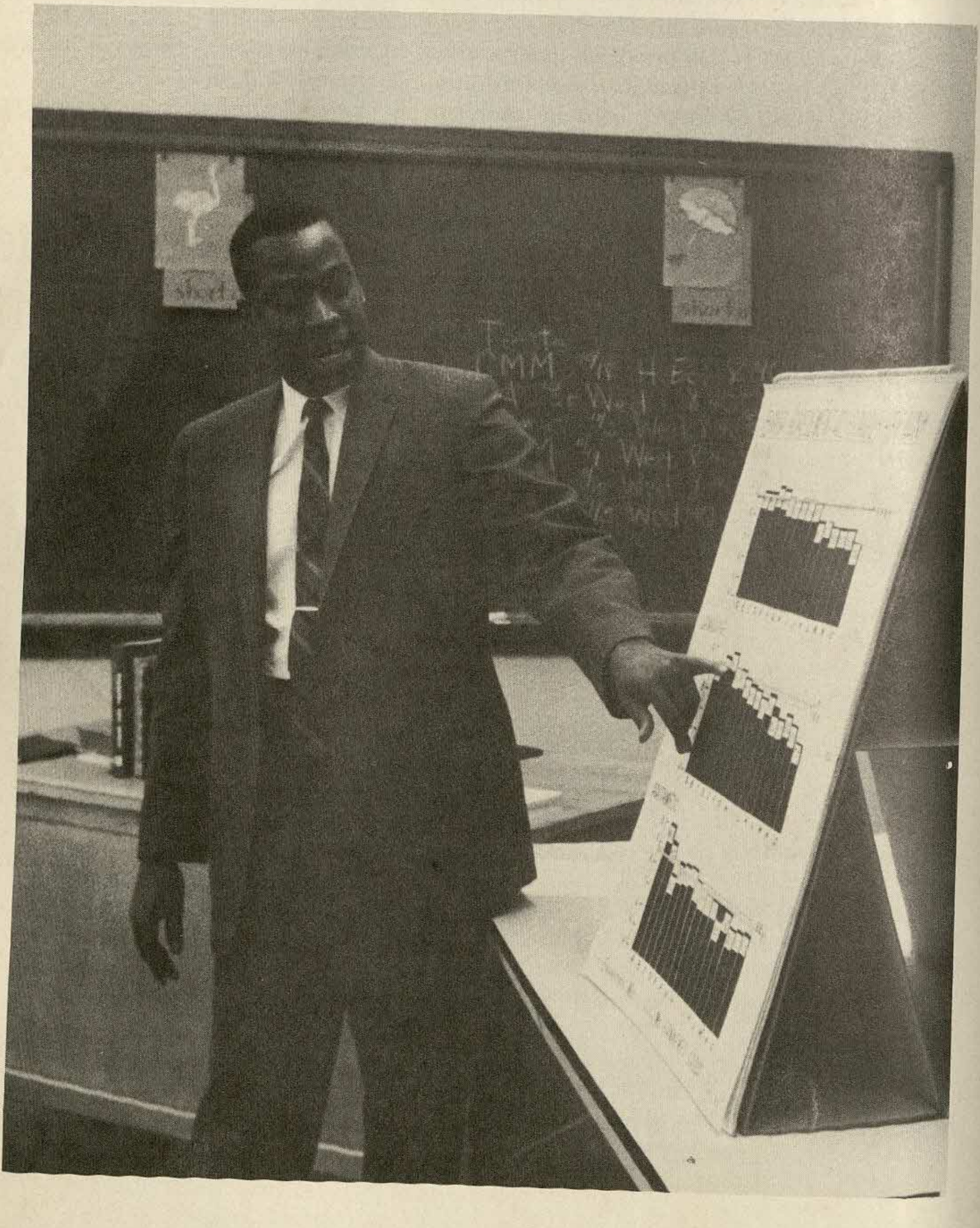

17

The Teacher and His Own Adjustment

Up to this point we have addressed ourselves almost exclusively to the following question: "What can we find in psychology that might help you to teach in more effective fashion?" Having considered that crucial question, we now ask, "What can we find in psychology which might help you to enjoy your work more fully and to feel less distress over the annoyances intricately linked with teaching?" The teacher is a person as well as an instructional agency. His well-being is an important end in itself.

The Emotional Adjustment of Teachers

At one time, the general folklore held teachers to be a somewhat neurotic lot. Semijournalistic accounts (Shipley, 1961) painted a shocking picture of mental illness in the profession. More recent accounts (Bentz, Hollister, and Edgerton, 1971) show less mental disturbance in teachers than in the general population. Judicious reexamination of the earlier data, moreover (Kaplan, 1959), shows that even in those earlier accounts, teachers differed little from the general public in the matter of mental health. Teachers are certainly less likely than nonteachers to be actually committed to some institution. But this is no great cause for satisfaction. Like other people, perhaps as many as 10 percent of teachers might do well to consult a specialist and another 15 percent are unusually nervous, although, as yet, in little danger of losing touch with the real world. Among the remaining three-quarters of teachers there are many, of course, who have their share of problems, but these problems consist largely of the worries, shynesses, and sensitivities which plague many people but which seldom threaten a major disruption.

Worries among teachers are by no means distributed uniformly (Thompson, 1963). Most teachers have only a few, but a very few teachers carry quite a burden of anxieties. Student teachers feel considerable tension just prior to practice teaching. These are the natural anxieties about the reactions of the critic teacher and the way the pupils will behave. Worries fall off after practice teaching has started. In one investigation (Mitchell, 1965), anxieties were most pronounced in the beginning secondary school teachers who were going into teaching for practical reasons. There were fewer worries felt by those who were motivated by interest in children or by interest in the subject to be taught.

Satisfaction in Teaching: A Brief Review

In Chapter 1 we considered the things which entice teachers into the profession and which provide satisfaction for those at work. The advantages are very real. The work of the teacher, however unglamorous it may seem, is universally regarded as socially useful and respectable. True enough, the whole process of schooling has been more and more subject to attack (Illich, 1971), but this is an attack on the system and not on the day-by-day work which goes on in the classroom. By and large, teachers have little need to justify the ethics of their work or to apologize for the contribution they attempt.

Along with its honorable social intentions, teaching is freer from the ruthlessness that characterizes many occupations. Although there is some competition within the profession, this probably operates with less ferocity in teaching than in many other professions. Typically there is less objective need to cut the other fellow down in order to enjoy moderate success. Certainly there is less of a clear tradition of competition in which the besting of a colleague is an essential part of the game.

This lack of an open, clear-cut tradition of competition may, of course, be a two-edged sword. Often, it is true, it permits people so inclined to ignore problems of competition in many phases of their work. On the other hand, when an element of competition does appear, the lack of a clear-cut tradition may invite guilt-inspired, clandestine activities that are often less wholesome than the open, cutthroat activities of some other professions.

Emotional Adjustment of Teachers and Other Groups

A psychoneurotic inventory was given to teachers, to a stratified sample of the general public, and to a group of community leaders selected from rural areas. Among the teachers there were an equal number of white and black, but four times as many women as men. The group representing the general public was selected to match the U.S. 1960 census with respect to age, sex, and race. This group had a low income and had a professional status considerably below that of the teachers. For the leaders, prominence and influence were the only selective criteria.

In taking the inventory, each person checks a list of twenty functional ailments (dizziness, stomach trouble, excessive sweating, etc.) and indicates whether he has this sort of trouble often (score of 3), sometimes (score of 2), or never (score of 1). The total score is the sum of these entries and could thus range from 60 to 20. High scores are considered to indicate poor adjustment.

	Teachers	*General Public*	*Community Leaders*
Number of people in each group	379	1405	418
Average score for each group	25.9	26.8	25.7
Percentage of people with:			
Good adjustment (scores 20–26)	61.4%	61.3%	66.8%
Moderate maladjustment (scores 27–33)	35.7	27.5	28.2
Psychiatric Impairment (scores 34–54)	2.9	11.2	5.0

SOURCE: W. Kenneth Bentz, William G. Hollister, and J. Wilbert Edgerton, An assessment of the mental health of teachers: A comparative analysis, *Psychology in the Schools,* 1971, 8, 72–76.

In satisfying the very human need for esteem, the teacher has a somewhat ambiguous position. As we point out later, he often feels lack of appreciation on the part of the general public. In many respects, however, the teacher has a fair opportunity to meet the need for the esteem of others. He is in a good position to secure the good opinion of his students. True, he usually cannot work directly toward this goal, but very often in the course of his daily work he may find incidental evidences of high regard from his students, or, less frequently, in the form of overt statements or formal testimonials.

In addition to the esteem of those directly in our charge, there is esteem (or lack of it) to be had from our colleagues and from our superiors. To the true craftsman, the praise from a fellow worker is a source of rich satisfaction. The criticism of one's peers is something to be reckoned with. Gradually the teacher is bound to achieve some sort of reputation (good or bad) in the eyes of his colleagues and superiors, and to some extent this will become evident to him.

This recital of the blessings of our craft would be incomplete without some mention of the more mundane advantages that we can expect. With respect to our working hours, we are in a somewhat ambiguous position. As we have seen, our work week is rather long. But to an unusual extent our schedule of hours is flexible and is under our own control. Although we must put in many hours, it is very often true that we can arrange those hours to suit ourselves. The long weekends and the summer vacations are not all free time, but they can be organized so as to give us fairly large blocks of free time if that is what we wish.

In the matter of physical health, the teacher is better off than most professions. In a typical year, 50 percent of teachers would have no absence due to illness, and less than 5 percent would have an illness of ten days or over. The average length of absence, including those who have no absence at all, is about a day and a half. There is, of course, much variation. Women have more absence than men, city teachers more than those in rural areas.

The financial plight of the teacher is well known. Clearly we are underpaid, and in some economic periods there are even serious problems about getting a job at all. There are some bright spots, however (NEA, 1963). Beginning salaries are not completely out of line with those in other professions. We are not so likely to face unpredictable layoffs. Pension systems of one kind or the other are now the rule (Stinnett and Haskew, 1962).

The Problem of Frustrations

Like any other worthwhile undertaking, teaching is not without its irritations and its headaches. This unlovely fact is to be expected and is taken for granted by all mature people. Any realistic view of a profession must include these obstacles and frustrations as well as the positive satisfactions to be gained.

General Dissatisfaction

It is clear that a disproportionately large number of teachers leave the profession each year, perhaps as many as 10 percent (Stinnett and Haskew, 1962). There is room for argument as to whether this is a good thing or a bad thing for the profession. It does suggest, however, that many people find some other activity more acceptable. It also suggests some disillusionment on the part of the teachers who leave. When so many are motivated to leave, moreover, we suspect that many more teachers experience misgivings but fail to take the decisive step. Among those remaining in the profession, some 15 percent would not go into it again and some 12 percent are doubtful about the wisdom of their choice (Kaplan, 1959).

Morale and Its Factors Men are especially likely to drift out of the profession. Whereas the average woman teacher has some fifteen years' experience, the average for men is only nine (Grambs, 1965). Half the men in the profession are under thirty-four, whereas, for women, this median figure is forty-five. The men who do leave the profession after a short period of service tend to be more intelligent and to be earning higher salaries. Nevertheless, they better their earnings after they leave (Thorndike and Hagen, 1961).

For the young male still in the profession but frantically trying to better himself, we might expect morale to be low (Suehr, 1962), and this is so. The morale of all men taken together, however, may exceed or equal that of women (Rempel and Bentley, 1970). For both men and women, moreover, the morale is higher for older than for younger teachers. Not surprisingly, teachers with strong leanings to authoritarianism are reconciled to the activities of the school system (Gubser, 1969) but not necessarily to the behavior of students. There is higher morale among those who have taken at least one degree beyond the bachelor's than among those who have not yet taken this step (Rempel and Bentley, 1970). Interestingly enough there are few differences in morale between teachers of different subjects or between vocational and academic teachers.

Morale, as measured, includes quite an array of separate factors (Coughlan, 1970; Rempel and Bentley, 1970) and covers such things as attitude to the school board and to the general administration arrangements; satisfaction with work load and the physical facilities; relations with the principal, with colleagues, and with the community; feelings about the attitude and performance of students; and salary, degree of autonomy, and opportunity for advancement.

Dealing with the Fact of Frustration

Clearly the teacher's lot is not one of unalloyed joy and serenity. We are about to consider some of the distresses and irritations that are most frequently mentioned. Before doing this, however, we should look briefly at the problem of treating frustration in general.

A Structured View of the Frustrations To deal adequately with any one of the frustrations we shall list, it is important to see the total structure. We must not pretend that the objective irritation (e.g., lack of promotion) does not exist. We must also resist the temptation to pretend that we do not care. (It is possible, of course, that some people really may not care, but they should decide this after a searching look at their feelings.) We should examine the problem to see if it seems susceptible to remedy, or at least to attack. If so, the wholesome thing is to throw ourselves into an attempt at correction. If not, we must learn to live with the problem and, when this is so, there is renewed urgency for adequate perspective or structure. At this point, we must see it as one of those stubborn and unpleasant facts of life, such as disease, pain, ingratitude, or death. But we must not let this very real disappointment obscure the other parts of the picture which may do much to produce a balance.

Getting the Necessary Help For the most part, the frustrations we cannot alter will remain as irritants to be dealt with and absorbed as part of the teacher's life. If we find it becoming too disruptive, however, we should not hesitate to seek help of one kind or another. Many people (Laycock, 1960) recommend group discussions with those who share the frustrations. The usefulness of such discussions comes not only from the fact that misery likes company but also from the fact that various presentations cannot help but broaden the picture. From the descriptions other people offer, moreover, we may get a better picture of any trouble that seems to have a unique or suspicious impact on ourselves. Finally, there is some advantage in sheer ventilation. For people under stress, one of the simplest forms of relief is the act of talking about the stress in a permissive setting.

When any single frustration, or the whole cluster of frustrations, looms up so frighteningly as to threaten our general well-being, there may be some gain from reading a shrewd and practical discussion of the problem of dealing with stress (Stevenson and Milt, 1960). Perhaps even a review of a chapter on mental health may help to regain perspective in this matter. But if the threat continues, or seems to grow, we should certainly seek professional help. Indeed, many teachers report benefits from psychotherapy even when they were not faced with some serious crisis (Jersild and others, 1962).

Frustrations Frequently Experienced

Perhaps because of the concern over the number of teachers leaving the profession, there has been much study of teachers' frustrations and worries (Olander and Farrell, 1970; Havighurst and Neugarten, 1962; Rudd and Wiseman, 1962). The total list of dissatisfactions is extremely long (Blocker and Richardson, 1963). No doubt any other group of people would also produce an impressive array of troubles if frequently and solicitously urged to reveal their grievances.

The intelligent student will not be disturbed, of course, by the fact that more space is devoted to frustrations than to satisfactions. The prospective wayfarer needs only slight instruction to permit him to enjoy the satisfactions of his trip. With a minimum of briefing and sensitization, these rewards will be appreciated as soon as they are encountered. The obstacles to be faced, however, constitute a different story. Very often much instruction is necessary if these are to be dealt with adequately.

Confusion About Roles As we have seen, there are a great many different roles that teachers might be expected to fill. It is not surprising, therefore, to find that many teachers are confused about the basic work they are supposed to be carrying on (Reitman, 1971; Grambs, 1965; Allinsmith and Goethals, 1962).

Psychotherapy for Teachers?

As the outgrowth of another project, the investigators located 200 teachers who had received at least two years of psychotherapy. Over 100 of these were interviewed and some 96 others filled in an inventory.

For most of the teachers, the decision to undergo therapy was quite a struggle. The final decision was motivated by intense personal problems or by a desire to live more zestfully. Many were helped in their decision by support from friends or relatives.

Benefits attributed to the therapy:

- Deeper insight into own anger (90 percent of group)
- First realization that own anger was a problem (66 percent)
- Deeper insight into nature of anxiety (90 percent)
- Less disturbance over the problem of handling anxiety (90 percent)
- Ability to engage in competition with better grace (many of the group)
- Less need of approval or adulation from others (many of group)
- Less distress when confronted with personal problems of students:
    - Can offer help with assurance when that seems wise (90 percent) or can be comfortable in refusing to "treat" the problem when it seems to be one for the specialist (92 percent)

Considerable change in women's attitude toward their femininity. (Less change in men's attitude toward their masculinity.)

More candid in reporting sex problems

Concern about sex shifted from physical to emotional aspects

A control group, not experiencing therapy, reported similar types of improvement over the same period of time, but not to the same extent.

Supplementary Note: In this same article the editors of the *Phi Delta Kappan* report a survey of opinion from 68 teachers in one California high school. Some 90 percent of these teachers believed that unconscious factors play a big part in life. About 45 percent thought it would be a good idea if many teachers were psychoanalyzed, and over two-thirds would themselves be willing to undertake psychoanalysis if they could spare the time and money.

SOURCE: A. T. Jersild, What teachers say about psychotherapy, *Phi Delta Kappan*, 1963, 44, 313–317.

This confusion has been made worse by the recent uncertainties about civil rights, the obligations expected of youth, and the claims of society on its constituent members. Even without this latter confusion, however, the teacher might easily be overwhelmed by the catalogue of all the functions (see Chapter 1) that he is expected to perform.

In addition to the large number of roles attributed to the teacher, there is the problem of disagreement about the priority of those roles. Teachers often have a definite idea of what they think they should be doing, but see the general public, and especially the formal school system, as having conflicting views. Many teachers, for instance, think that a great deal of attention should be given to direct work with pupils, to satisfying relations with other teachers and with supervisors, and to a reasonable basis for professional advancement and recognition. They see their superiors, on the other hand, as giving a low priority to these matters. They feel that the administration attaches more importance to public relations, or relations with parents (the area of least importance to the teachers), than to the teachers' relations with pupils. Even when the administrators seem to pay attention to the "important" areas, the teachers see them still in opposition to the teachers' wishes. Teachers, for instance, would stress their own role of character models, and their responsibility for developing ability to think, love of learning, and the absorption of cultural values. They see the administrators, on the other hand, as largely concerned with preparing students for college and with the problem of keeping order in the classroom.

In this sense of conflict with the powers that be, the teachers may be largely mistaken. Those in charge of the system may not have the views attributed to them. Such a misapprehension, of course, does not in itself do away with the distress. If you really believe that your house is burning down, you are disturbed, no matter how ill-founded that belief. The possibility of misapprehension, however, does suggest a means of dealing with the frustration. If you should be disturbed by this sense of being at odds with important other people, the first thing to do is to find out exactly how much disagreement does exist. Very often there is much less than you may assume. Even when a systematic look does reveal substantial disagreement, you are in a much better position to deal with the problem, emotionally as well as practically, when you can structure this disagreement and obtain a clearer picture.

General Disillusionment Like workers in many other fields, teachers often feel a marked contrast between the rosy ideals with which they began their work and the very practical realities they encounter as they go along. Hopes for some simple sure-fire gimmick or approach must be abandoned. For some teachers there is a gradual weakening of the earlier dominant urge to promote the greatest possible development of children. This is partly replaced by the more practical need to survive within the system. The emphasis is not so much on the child to be helped as upon the task to be accomplished. This loss of idealism is, of course, by no means universal, and many teachers continue to relish the many valued activities within the profession. When it does occur, however, it is a serious frustration for the teacher concerned.

Hostility of Students For many teachers, student hostility (Chapter 16) or indifference comes as a shattering blow. Many of us begin the work filled with goodwill toward the students we have yet to know, and are earnestly resolved to offer genuine help and support. At some time, however, many of us are led to feel that our friendship is not reciprocated, that students regard us just as a member of the establishment, and resent us, or brace themselves against our sincere attempts to help.

Much of this surly behavior on the part of the students should not be taken too seriously. It is a matter of manner or style rather than a genuine feeling of dislike. Some resentment may be there, however, and it is one of the unlovely things that the mature person must learn to live with.

Obstacles to Effectiveness One very natural frustration on the part of many teachers is the feeling that they simply cannot get their work done. For this serious problem they see several reasons. In one recent study of elementary schoolteachers (Olander and Farrell, 1970) sheer lack of equipment or materials was the chief source of worry. The next most serious worry was lack of time for attention to individual pupils. These teachers thought that many of their difficulties would be solved by teacher's aides or similar help. These teachers, however, like teachers in the past, also attribute the problem to the pupil's lack of interest in learning (see Thorndike and Hagen, 1961; McLaughlin and Shea, 1960; Solomon, 1960). Other teachers find the chief obstacle in the large classes, the amount of time and energy they must give to problems of discipline, the endless clerical tasks, and the frequent interruptions in their classroom work. Still others feel that the chief difficulty lies in having to teach subjects for which they are really not prepared. A teacher who has majored in English, for instance, could find himself assigned to teach history or algebra.

Along with these factors which may reduce actual accomplishment, we face serious difficulties in becoming aware of what we have accomplished. As teachers, we are handicapped by the fact that the results of our activities are seldom immediate and definite (Snow, 1963). In contrast to the machinist or house painter, we do not get a vivid and concrete feedback from each of our actions or efforts. To find out what we have accomplished, we must often give tests (Chapter 10) or go to a great deal of trouble. Typically we must wait. Often it is only at the end of the unit, or the year, or many years later, that we come to know whether or not our pupils have profited from our efforts.

This feeling of working in the dark deprives the teacher of many sources of satisfaction and, to that extent, leaves the creative needs partially unfulfilled. Fortunately this frustration is one that invites direct action. Much has already been said about the methods of testing and of obtaining dramatic records of academic growth. Insofar as these devices can be adopted and automatically incorporated into regular practice, this need for self-expression will be partially met.

Many of the obstacles to effective work would be irritating in their own right, even if they did not seriously interfere with the basic enterprise. Teachers feel this way about the deluge of minor chores for which they are responsible. These include cafeteria duty, corridor patrol, playground supervision, and endless clerical work (Metfessel and Shea, 1961). The irritation comes not entirely from the fact that these chores have to be done, but partly from the fact that they are *assigned* by some person who, presumably, has some choice in the matter. The typical teacher in the old-fashioned one-room school would perform all these duties, and many more, simply because they had to be done and there was no one else to do them. But it is one thing to have objective circumstances thus point the finger at you, and quite another thing when some administrator deliberately decides that you should spend your time on these seemingly menial chores.

The Complexities of Social Issues The school is dramatically involved in far-reaching social turmoil. Questions of civil rights are soon felt, and perhaps most keenly felt, in the setting of the schools. And many teachers must face problems of busing, of demands for district control, and of concern about bias in the staffing of schools. To the teacher-activist this intimate involvement in vital social issues may be most encouraging and welcome. To the teacher-scholar, however, or to the teacher intent on his job, these things may add to the difficulties already complicating his work. The musty library and the remote classroom have now been pushed into the most active part of the firing line.

The Lowly Status of the Profession

There is some discussion about whether or not teaching qualifies as a profession, or whether our natural affiliation is that of a trade union (Havighurst and Neugarten, 1962; Wolpert, 1961). It is true that no one can say for sure just what makes a profession (Becker, 1962). But whatever the criteria may be, there is some feeling that teaching is lacking in some of them. It is held, for instance, that teaching includes too many diverse activities to be considered a single profession and that its members have too little to say as to who may enter the craft (Anderson, 1962; Lieberman, 1956).

Whatever the fate of our aspirations to the status of a profession, many teachers feel some distress over the lowly prestige of teaching. Younger men leaving the profession give lack of prestige as one of the reasons (Thorndike and Hagen, 1961). Compared to nurses, social workers, and psychologists, teachers are more given to worrying about matters of prestige (Charters, 1963, p. 748). Even within the profession there are often strong feelings of relative prestige, if not of outright snobbery. Teachers of English, physics, or mathematics are typically accorded more prestige than teachers of bookkeeping, penmanship, or plumbing (Humphreys, 1970; Stephens, 1967). There is some evidence, incidentally, that this pecking order may be less marked when the less prestigeful subjects are taught in the same building (Humphreys, 1970). The age level makes a difference. College instructors elicit more prestige than secondary school teachers and these, in turn, outrank the teacher of children in the elementary school or in the preschool. To the psychologist these unlovely facts are

The Woes of Teaching in England and in California

The information for the California teachers was obtained from 27 schools in 5 counties. An investigator spoke to the teachers at a regular faculty meeting and asked them to fill out a questionnaire. A total of 793 teachers took part.

The information regarding the teachers in England is based on 590 reports. In this group 92 percent reported that, in spite of the listed annoyances, they found teaching to be a most satisfactory profession. This was especially true for teachers of quite young children and for teachers of adolescents. In general, as we move from younger to older pupils, we find less satisfaction for women, more for men.

Specific Dissatisfactions: (Rank of 1 means that this dissatisfaction was most serious for the group in question)	*Teachers in California*		*Teachers in England*	
	Secondary	*Elementary*	*Men*	*Women*
Low Salary	1	5	1	13
Inadequate Physical Equipment		4	3	2
Working Load: Large Classes	4	7	8	1
Heavy Teaching Load			4	3
Not Enough Time			9.5	5
Excessive Clerical Work	3	1		
Supervision of Cafeteria	8	2		
Too Many After-School Meetings	7	3		
Problems with Administrators				
Rigid School Organization			9.5	8
Poor Staff Relations	6	5	2	6
Frequent Class Interruptions		8		
Problems with Students				
Indifference to Learning	2	9	12	11
Discipline	5	6	16	18
Feeling of Professional Inadequacy			7	6
Lack of Training		10	5	4
Low Prestige of Teaching			6	15

SOURCE: California data from J. W. McLaughlin and J. T. Shea, California teachers' job dissatisfaction, *California Journal of Educational Research,* 1960, 11, 216–224.

English data from W. G. A. Rudd and S. Wiseman, Sources of dissatisfaction among a group of teachers, *British Journal of Educational Psychology,* 1962, 32, 275–291.

challenging mysteries to be explained (Stephens, 1967). The teacher should face these facts, correcting them when possible, living with them when not.

Not only do teachers feel much concern over the problem of prestige, but they aspire to a higher status than do the other groups. To a greater extent than these other groups, they tend to underrate their true standing in the eyes of laymen.

Although the laymen may hold our profession in higher regard than teachers think they do, still the prestige accorded is by no means exalted. In nation after nation, teaching regularly falls below the prestige of a chartered accountant or army officer, and just above that of farm owner and operator. The teacher comes off somewhat better when people are asked to estimate his social status as a person, instead of the status of his work (Groff, 1962). Even here, however, he is below other professions (Warner and others, 1960).

Although our work is often accorded little prestige, especially, perhaps, in the eyes of the young (Allinsmith and Goethals, 1962), it is regularly considered to have great social importance. There is, of course, nothing paradoxical in this discrepancy. Of all the factors that contribute to occupational prestige in the minds of the young, social usefulness or moral worth come rather far down the list. An occupation is most likely to have prestige when it is regarded as being interesting and challenging, when it seems to demand rare abilities and originality, and when it is considered to have much influence in the world of affairs (Garbin and Gates, 1961).

The Teacher Stereotype In television and in the movies, in literature and in the public mind, the teacher stereotype has often been most unflattering (Grambs, 1965; Charters, 1963; Furness, 1962; Belok and Dowling, 1961). "Teacher" is the epithet that Eliza Doolittle hurls at Professor Higgins when his repeated corrections drive her beyond endurance. Sober studies, moreover, report a feeling of social ostracism or lack of acceptance on the part of many teachers.

The teacher's reputation for docility certainly seems to be changing (Rosenthal, 1971), and the stereotype must be enlarged to include the militant teacher who protests, agitates, and goes on strike. This more militant role is particularly true of men.

Part of the derogatory features of the teacher stereotype may contain a hint of social snobbery. To a great extent our ranks are filled, not from the families of professional men or of powerful industrialists, but from the homes of farmers and semiskilled workers. In contrast to most professions, the proportion of black to white teachers reflects almost precisely the racial distribution in the population at large (Rosenthal, 1971). Ours is the occupation most open to those seeking to move up a notch or so from lower-middle-class status. In these circumstances some of us may well betray the uncertainties of the newcomer. Others among us, expecting a snobbish reception, may be unduly defensive.

The teacher stereotype is markedly feminine. "She" is the pronoun typically used for the teacher. And, in the elementary grades, especially, this is statistically correct. Almost nine out of ten teachers are women (Grambs, 1965). This statistical picture may be changing, and the occasional male is to be found in the kindergarten (Williams and Johnston, 1970). Most men who work with

The Teacher in Community Life

The teachers in this study consist of a sample drawn from 22 counties (66 communities) in Pennsylvania. The sample was selected to reflect the general distribution of teachers (elementary, secondary, vocational, and so on). During an interview each teacher discussed the part he played in various organizations and was assigned a participation score. His participation score for *one* organization could range from 1 to 15. Total participation scores for one teacher ranged from less than 10 to more than 100.

Average Participation Scores of Various Groups

Top Business and Professional Men	65
Persons Identified as Civic Leaders	51
TEACHERS	50
"Natural" Leaders in Urban Groups	46
Semiprofessional, Managerial Workers	29
Clerical Workers	16
Elementary School Teachers	48
Vocational Teachers	55
Guidance Counselors	63
Teachers 20–25 Years of Age	38
Teachers over 30	51
Teachers Earning Less Than $4000	48
Teachers Earning over $6000	55

SOURCE: R. C. Buck, The extent of social participation among public school teachers, *Journal of Educational Sociology* (April[a]), 1960, 33, 311–319.

[a] In this volume there is a page 311 in both the March and April numbers.

younger children realize that their masculinity is sometimes questioned, and most of them, again, face this issue with a smile.

Social Restrictions At one time the community life of the teacher was rather limited if not actually monastic. He helped out rather than participated. His private behavior was expected to be much more decorous and circumspect than that of the other citizens. There is some evidence that things are now changing in both respects. The more militant teacher may now be taking more initiative in community affairs. The protesting teacher may be more daring in matters of civil rights, dress (see below), and the forthright treatment of sex.

The Administrative Establishment

The boss or the system is seldom popular with the people whose lives are being managed. There is some evidence that in recent years teachers are somewhat less disgruntled with their immediate principals than in the past (Olander and Farrell, 1970). But there is considerable annoyance with school boards and the more formal bureaucracy (Allinsmith and Goethals, 1962).

For the more ambitious teacher, the problem of advancement has been serious. The bitter arguments about merit pay have served to heighten this discontent (Grambs, 1965). Many teachers believe that this concept of merit pay calls for an unrealistic reliance on measures of success, and on undependable ratings by supervisors. To their minds it is no improvement over the equally dubious reliance on advanced degrees and records of in-service training.

The scholarly teacher has been greatly distressed by the cult of efficiency and by the school's infatuation with the trappings of big business. Such teachers feel that their work has become subordinated to the requirements of the computer, the accountant, and the efficiency expert.

Administrative Emphasis on Public Relations In the important matter of maintaining reasonable relations with the public, many administrators have led teachers to feel that this objective dominated the work of the schools. Administrators are held to be too ready to issue restrictive regulations in response to public outcry. In recent attempts to regulate teachers' dress or hair style, for instance, a number of school boards have apparently exceeded their legal authority and have been overruled by the courts (Hudgins, 1971). Conversely, teachers often charge the school officials with failure to support the teacher when some trouble arises with parents or community. In all this, there is often an underlying charge of hypocrisy. The administration is free to give the public an idealistic or sentimental account of the goals and procedures of the schools, leaving the harassed teacher to try to live up to these grandiose expectations.

Reassurances in Teaching

Frustrations should be faced, analyzed, structured, and examined with a view to corrective action. But they must not dominate the picture. They are things to get around. As soon as they are removed, circumvented, or absorbed, we are free to get on with the positive satisfactions that teaching provides. These satisfactions and rewards have already been considered in Chapter 1 and at the outset of this chapter. At this point we refer to some general issues that offer reassurance and hope to the teacher in his work.

Spontaneous Forces Inevitably at Work

Learning is an exceedingly complex process, based on mechanisms just now coming to be understood. Within the classroom we direct this process by an ancient art which, in its psychological dynamics, may have changed very little

Principals Preferred by Different Types of Teachers

A choice-motivator scale was administered to a class of 227 teachers enrolled in a graduate class. The group consisted of both men and women, representing elementary through high school, and having had various amounts of experience. In this scale the teachers made choices between pairs of possible vocations (explorer—manager) and gave reasons for each choice. On the basis of their answers they were classified as being motivated largely by desire to avoid distress, failure, and responsibility, on the one hand, and by the urge toward risky self-actualization, on the other. The teachers also checked off the characteristics of the "ideal" principal, making their choices from a prepared list of possible traits. These responses were used to determine each teacher's liking for principals who were chiefly concerned about the school *system* and also for those who were chiefly concerned about *people*. When sorted differently, the responses were used to indicate whether a teacher preferred a principal who exercised a good deal of control or one who "optimized" the situation, allowing much room for autonomy.

In the descriptions of the ideal principal, there were no differences between the more adventurous teachers and those more oriented to security. Both preferred the principal granting considerable autonomy. Interestingly enough, in both groups, the teachers giving a high rating to the "system"-oriented principal also gave a high rating to the principal oriented toward people ($r = .52$).

SOURCE: Thomas J. Sergiovanni, Richard Metzcus, and Larry Burden, Toward a particularistic approach to leadership style: Some findings, *American Educational Research Journal*, 1969, 6(1), 62–79.

over the centuries. It is possible that, as in other fields, the mechanisms responsible for learning may become susceptible to more meticulous control (see below). In this hope we may be encouraged by the precise control achieved by the physicist and chemist over the ancient processes of combustion and by the physician's increased control over the mechanisms of disease.

But even while we wait for this new day—however hopefully, or however dubiously—we can find much to reassure us in the approaches now available. Truly vital concerns can never be completely dependent on complex sophisticated technology. Compared to the reproductive technologies that may be available to our descendants, our present methods of begetting, bearing, and nurturing children may seem laughably archaic. But these ancient reproductive doings have dependably populated the earth. Long before the current technological breakthroughs, moreover, farmers raised crops, confidently relying on dependable processes they only dimly understood. In the same way, primitive nurses watched sick people recover, thanks again to mechanisms beyond their understanding.

Learning may be less vital or urgent than some of these activities, but in many respects it has been essential for survival. It is through the processes of learning that the child comes to avoid the more familiar menaces of his environment, that he takes advantage of the good things to be had, and that he learns the language of the adults around him. It seems almost unthinkable that we should not find within those adults some dependable machinery—suggestive of instincts—which would regularly link up with the mechanisms of learning to be found within the child. The child can learn the typical tasks that confront him (the language, for instance), but he will not do so unless the adults treat him in a certain way. Since children have regularly learned the adult language, adults must have regularly supplied the necessary treatment.

One of your authors (Stephens, 1967) has pointed out primitive, nondeliberate tendencies which are to be found in everyone, and which—whatever the intention of the person himself—are likely to engage the mechanisms of learning to be found within the children around him, and to bring about some achievement. Even when she has no intention of teaching her child to talk, the primitive mother will direct words to him, thus stimulating him, and thus sensitizing him to verbal sounds. When the child himself utters a recognizable syllable, she will react with spontaneous glee, seldom realizing that this spontaneous reinforcement contributes to the child's achievement. Later on, she unthinkingly, compulsively, supplies the word for which he is groping, thus guiding him into the correct response. Still later she may show *why* it is better to use this word rather than that, thus supplying insight into what leads to what.

These unthinking spontaneous tendencies, seen in the primitive home, are also at work when the most sophisticated teacher deliberately sets out to instruct. Whatever his training, this teacher will present some notions to his students. Even if he does not try to, he is bound to be pleased with some of their reactions, less pleased with others. He is spontaneously impelled to guide his pupils toward an answer that eludes them. If he does not do so it is through the exercise of deliberate restraint. Again he is almost driven to point the moral—to show what follows from a given way of behaving. These helpful spontaneous tendencies automatically come into operation whenever an adult, enthusiastic about some field of knowledge, regularly consorts with growing children. If this view is correct, some instruction in the adult's special field will result even when this "teacher" makes no deliberate effort to instruct and when he is ignorant of what he is accomplishing. Complex as the teaching process is, the crude rudiments are taken care of by automatic tendencies found to some extent in all adults and conspicuously present in quite a few.

These primitive, automatic tendencies may hardly suffice, and any teacher will seek to refine and modify them and make sure that they operate in more efficient fashion. But in this deliberate refinement you do not start from nothing. It should be comforting to realize that in managing this complex and awesome

The Unhappy Reliance on Administrative Intervention

Educators have tried to improve the schools by changing the curriculum, the training of teachers, and the methods of instruction. The results have been most disappointing. The following quotation suggests that in our preoccupation with these administrative changes, we have been on the wrong track.

> This preoccupation with the conspicuous and artificial aspects of education reminds one of an amusing, if spurious, account of the origins of agriculture. There was once a suggestion that, in some early burial services, it was customary to place wild grain in the grave for the use of the deceased in his new life. Inevitably some of this grain was spilled around the edge of the grave. In that fertile soil it took root and flourished, ultimately providing a harvest. The survivors noticed this result, and soon a definite principle was formulated: At a certain season, bury a corpse with all the proper ceremonies, and in due course there will be grain to harvest. The corpse, of course, was the most prominent feature of the process, and it became the focal point around which the whole principle was organized. When the planting season came around, corpses were in great demand and were even produced to order when not otherwise available. It was upon the treatment of the corpse, moreover, that the success of the harvest was supposed to depend. It was not until many years later that some bold radical questioned the value of this main feature of the process and found, after experimentation, that the planting would be almost as effective if there were no corpse at all.
>
> It is easy to focus our attention on the conspicuous, dramatic events that call for deliberate decisions. Conversely, it is natural to ignore the humble, ever-present forces that work consistently, independent of our concern. Seeds sprout and take root, and plants mature, with little attention from us. Corpses, on the other hand, call for deliberate and careful attention.
>
> There is a disturbing possibility that the elaborate program of instruction in our educational system may be somewhat similar to the corpse in the planting ceremonies. Like the corpse, it is the most conspicuous feature of the process. But, again, like the corpse, the elaborate administrative arrangements may turn out to be rather incidental features in the basic process.

SOURCE: J. M. Stephens, *The Process of Schooling: A Psychological Examination* (New York: Holt, Rinehart and Winston, 1967).

process, you do not always have to manipulate, in deliberate and conscious fashion, each minute aspect of the learning process operating within the child. On the contrary, put yourself in a situation in which teaching is in order, let yourself go, and, by virtue of the spontaneous urges to be found within you, *some* teaching will probably take place.

Exploiting the Natural Forces In deciding about yourself and teaching, you must give much weight to thoughtful, rational considerations such as your idea of the purpose of education and the relative importance of this or that emphasis. Along with these important, rational factors, however, you should feel free to indulge the more primitive tendencies which, as we have just seen, play a tremendous part in teaching. Professor Burch (1957), for instance, has held that the chief *obligation* of the teacher is to give spontaneous expression to the educated man that he finds within himself. In other words, your job is chiefly to do what you, *as an educated person*, feel like doing. Notice that the idea of the educated person keeps cropping up. Not all your needs are to be spontaneously expressed, but chiefly those that stem from you as an educated person.

Views of the Natural Forces

The theory of spontaneous forces in education has been described as a pessimistic view (Gage, 1970, 1968). Because of these prevalent and influential spontaneous forces, many administrative changes in education have had little effect (Chapter 11). There is little gain, for instance, when we move pupils from large classes to small; from small high schools to large; from heterogeneous groups to homogeneous groups; from regular teaching to programmed instruction. In the minds of other theorists, however (Stephens, 1967), it is wrong to emphasize the element of *failure* in these results. True enough, they do show that academic achievement does not respond to these administrative manipulations. But in each of the arrangements a considerable degree of achievement does occur. Some forces, common to all the administrative arrangements, must be producing this substantial achievement. Our attention should be focused on the high probability of this success and on the forces that produce it. These beneficent forces, allegedly residing in the teacher's spontaneous inclinations to commend, to correct, to point the moral, and to supply the elusive answer, are steadily at work even when the administrative arrangements are unfavorable, or when the teacher neglects some technical refinement. This whole picture, far from being pessimistic, is reassuring in the extreme.

The Hope for Technological Advances

The presence of spontaneous forces carries a pessimistic note only so long as we put our complete faith in large-scale interventions which have no influence on the basic spontaneous mechanisms. In caring for the sick child, for instance, perhaps it really does not matter much whether we serve him poached eggs or scrambled, orange juice or pop; whether we keep him flat in bed or allow him to sit up. But to find that these gross manipulations make little if any difference is not to suggest that *nothing* will ever make a difference. When we turn our attention to the mechanisms actually at work—phagocytes, bacteria, cell structures—we may find undreamed of possibilities for effective intervention. And when, in teaching, we begin to examine the lowly teaching mechanisms which actually do the work, who knows what breakthroughs may be possible? According to this view, such breakthroughs are most likely to come from a study of the intimate mechanisms which lead a teacher to wax enthusiastic about some subject the student would otherwise neglect, to smile at this, to frown at that, to help the child toward an answer, or to let him struggle on his own.

Promising Sources for Advances Some of the hoped-for technological advances may come from the meticulous analysis of the steps in learning. Taking their cues from the computer engineers (Chapter 4), many psychologists are now looking at various learning tasks, and are working out in realistic detail the many specific steps that must be accomplished to achieve the larger goal. Perhaps when the process is spread before us in microscopic detail, we may see many opportunities for shortcuts or for more effective recombinations. The teacher so inclined has some reason to hope that some day teaching will consist of the meticulous direction of well-understood processes. Like the engineer, the teacher of tomorrow may manipulate whole responses, bits of information, and the molecules of thoughts in precise and positive fashion. To do this he may have at his disposal a vast array of equipment and of stimulating materials. These he may be able to deploy at the touch of a key as the perceived condition of the student demands them.

Whether or not we attain these technological goals depends not so much on the technical skill of the engineers as upon the ability of psychologists to set forth the basic mechanisms of schooling with the necessary degree of precision. When this is accomplished (Chapanis, 1971) the engineer can move methodically toward the provision of materials. At a less molecular level the elaborate hierarchical analysis of Gagné (Chapters 7 and 10) and the detailed provisions of prestructures of Ausubel (Chapter 7) may lead to much more efficient procedures in teaching.

The classroom teacher, interested in these possibilities, should find many opportunities to cooperate in research projects. Those willing to acquire the necessary preparation in mathematics and statistics may even take considerable initiative and responsibility for planning and conducting experiments in this field. For those less actively involved there should be much excitement in following the developments and watching the hopeful ideas that materialize along with those that fail.

To experiment is, of course, to step into the unknown, and this inevitably involves some risk. Responsible investigators will take every precaution to keep the risks to a minimum. In considering this problem, the investigator and the cooperating teacher can feel some reassurance as they remember the dependable spontaneous forces inevitably at work within the typical classroom. Whether we try this approach or that, these forces are likely to be at work and to guarantee some achievement. Even when we do not find the new key to outstanding efficiency, we can be reasonably sure that, thanks to these ever-present and lowly forces, we will not precipitate disasters.

The Claims of Energetic Application

Meanwhile, as you wait for the army of venturesome researchers to develop some bright new procedure and thus transform the teaching process, you are free, for the time being, to let yourself go within the classroom, enthusiastically exploiting any procedures that happen to fit your individual style. You can accomplish much by the unashamed and spontaneous expression of the educated person that you are. With the judicious use of the hints and devices suggested in these chapters, you can accomplish somewhat more, and save yourself some grief. But in our present state of technology, the teaching art does not begin with devices and techniques. These are the guides and, occasionally, the restraints. Without the teacher's sincere and urgent concerns, persistently expressed, the supplementary guides would serve no function. We need the guidance and restraint imposed by "the snaffle and the bit," but we must never lose sight of the surgent horse to whom these factors are applied.

Summary

Teachers face the normal risks of maladjustment, although they probably fare somewhat better than people in many other lines of work. The profession carries more than its share of rewards. The lover of learning is actually paid for carrying on his affair. To those with strong social commitments, there is, at the best, an opportunity for high adventure, and at the least, the assurance of social worth. For those who shrink from the dog-eat-dog competition in other areas, there is the possibility of a more civilized life. Esteem is to be had from some sources, although not from all. Working conditions and salaries show some improvement over the past.

The frustrations of teaching are real and many people leave the profession each year. Frustrations are higher for younger, nonauthoritarian teachers, especially for men in these categories. However, men, in general, report a higher morale.

Frustrations can be dealt with when honestly faced. At times the irritating conditions can be corrected. At other times, they can be absorbed without disaster. Help is available when trouble threatens.

The worries that plague the teacher come in many forms. Very often the teacher is either uncertain about his basic function or feels that he is at odds with his superiors. He worries about his ambiguous social status, feeling that he is appreciated but patronized, and perhaps curtailed. He often sees little opportunity for professional advancement. Because of lack of equipment, interfering tasks, and student apathy (or hostility) he often feels ineffective. This is made worse by the difficulty of knowing just how much he is accomplishing.

Satisfaction in teaching should come with a clearer picture of goals and needs. There are also many earthy sources of satisfaction in the basic process of teaching. Much of what the teacher does, and should do, can be seen as the natural, spontaneous expression of the educated person he finds within himself. The typical teacher has a store of natural and academic urges that he can well afford to indulge and cultivate. The work accomplished in this way must, of course, be supplemented by deliberate undertakings.

For many teachers there is much satisfaction in the promise of new technology which may analyze the teaching art into its basic elements and exploit those elements to produce exciting advances.

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Appendix

Some Elementary Statistics

Here are the scores of two groups of students who have been asked to give the meanings of ten Spanish words. In Group A the first student got 7 words right, the second, 5. For the entire group the scores were as follows: 7, 5, 9, 7, 8, 6, 7, 6, 8, 7. The scores in Group B were 5, 8, 7, 9, 4, 8, 5, 9, 8, 10, 7, 5, 9, 7, 8, 4, 9, 3, 7, 8.

Which group made the better score?

With the scores arranged in this helter-skelter fashion, it is hard to make a comparison. There is no need to worry, by the way, over the fact that there are twenty students in Group B but only ten in Group A. It is quite in order to compare the standing of two groups even though there are more people in one group than in the other. There are many more men in New York than in Nevada, for instance, but we could still find out if the average Nevada man is taller or shorter than the average man in New York.

To get some order into the numbers, we might try ranking them.

Group A: 9, 8, 8, 7, 7, 7, 7, 6, 6, 5.
Group B: 10, 9, 9, 9, 9, 8, 8, 8, 8, 8, 7, 7, 7, 7, 5, 5, 5, 4, 4, 3.

This makes things somewhat clearer but the numbers still seem rather disorderly. For one thing, it seems a little foolish to write one number over and over again. We might also feel some urge to match (say) the 8's in one group with the 8's in the other. We can take care of both of these problems by arranging a simple *frequency distribution.*

Frequency Distributions

First we make a list of the scores we have to deal with. In this list we make sure that there is a place, or score, for everyone. The highest score we have to arrange for is 10, the lowest 3. In this illustration it happens that our scores only go from 3 to 10, and there are no part scores. Here, then, we can find a place for every person merely by listing all possible scores from 10 through 3, as in the left hand column of Table A.1. If, on the other hand, the scores ranged from 3 to 100 or so, this procedure would make for a very long list.

TABLE A.1. Frequency Distributions for Successes in Identifying Spanish Words

List of Scores That Would Include All Students	*Number of Students Getting Each of the Listed Scores*	
	Group A	*Group B*
10		1
9	1	4
8	2	5
7	4	4
6	2	
5	1	3
4		2
3		1
Number of Students	10	20

From our ranks we see that in Group A there was one score of 9, two scores of 8, and so forth. In the frequency distribution we show this by writing in the number of students who got each of these scores. This procedure saves us from writing down 7, 7, 7, 7. It also matches up the students in Group A who got a score of 7 with those in Group B who got the same score.

Here we have a frequency distribution for each group. These distributions give us all the information that was in the list of ranks. They present this information, moreover, in a more compact and systematic form. We avoid the wasteful repetition of scores. We can see at a glance how many of each group got a certain score. We are also forced to notice the fact that no one in Group B got a score of 6, and we are automatically impressed by the greater range of scores in Group B.

This example of frequency distributions is unduly simplified. As we have noted, it deals with a very limited range of scores (10–3). It also ignores the possibility of part credit. There is no provision, for instance, for a student who got credit for 6.5 words. To take care of a much greater range of scores, and also to take care of partial scores, some modifications and elaborations would be necessary. But the principle would not be different.

By putting the scores in the form of frequency distributions we can get a clearer picture of the two groups. Group B, for instance, seems to fall into two clusters, the top cluster of fourteen students tending to exceed Group A, and a bottom cluster of six students tending to fall below Group A.

Averages and Ranks

Judgments that we can reach from general inspection are often very useful. For more detailed comparisons, however, we need a more precise measure. In comparing Group A with Group B *as a whole*, we would have to decide whether the good students in Group B more than offset the poor students. We need some kind of measure which will take these things into account.

The Arithmetic Mean

When we wish to get a single number to describe the average score, or overall score of each group, we often use the familiar *arithmetic mean*. This measure is so very familiar, indeed, that it is often called *the* average, in spite of the fact that it is only one of several ways that can be used to describe an average. To get the arithmetic mean we merely add the scores and divide by the number of cases. In doing this we could make use of the frequency distribution if we had already constructed one. For Group A we would add one 9, two 8's, four 7's, and so forth.

In our illustration you will find that both groups have an arithmetic mean of precisely 7. Using this more precise measure, then, we find that, on the average, there is no difference between the two groups. The superior scores in Group B are precisely offset or balanced by the very low scores in that group.

This concept of *balance* is extremely useful when we work a great deal with means. Suppose we had a weightless plank, 8 feet long, marked off to correspond to our scores (3–10). Suppose, further, that we had ten equal weights and placed these weights on the plank so as to match the frequency distribution of Group A. If, now, we placed this plank on a fulcrum it would balance precisely at the score of 7—remembering that the plank itself is supposed to be weightless. If we placed twenty weights for Group B in a similar way, the plank would also balance at the score of 7. It may help in several ways to remember that the mean is the point of balance (or point of zero moment). This fact may help you to visualize the mean. It is also useful in making shortcut calculations. / By sheer inspection, for instance, we could tell that the mean for Group A is 7, since there is an obvious balance around this score. The mean for Group B is not so obvious, but by canceling high scores against low scores we can determine the point of balance fairly quickly and quite accurately. In more advanced treatments you will make much use of such procedures in calculating means.

The Median

The median is another measure that is used to indicate central tendency. The median is merely the point on the distribution which divides the group in such a way that half the students will be above the median and half below. In Group B, for instance, half the students have a score of 8 or above. Half have a score of 7 or less. The median would be 7.5, or the boundary score between 7 and 8. Notice that this median would remain the same no matter what happened to (say) the last six scores. If all six of these scores were 0, the median would still be 7.5. It would also remain at 7.5 if all six of these scores were changed to 5 or 6. On the other hand, if one single student were to drop from a score of 8 to a score of 7, the median would be greatly affected.

In these respects the median is quite different from the arithmetic mean. A change in any single score will have some effect—great or small—on the mean. With the median, on the other hand, changes in some scores (those toward the extremes) will have no effect whatever, whereas changes in other scores (those near the median) may have a marked effect. Sometimes this differential sensitivity of the median is considered an advantage. If you should be suspicious of the extreme scores in your distribution, for instance, you might not want to give them much weight. In that situation you might prefer the median. For most purposes, however, the mean, with its more uniform sensitivity and greater stability, is the preferred measure.

Percentile Ranks

A student in Group B who gets a score of 7.5 would just surpass 50 percent of the group. He would, of course, also fall just below 50 percent of the group, but it is not necessary to state the matter both ways. Since a score of 7.5 puts a person just above 50 percent of the group, we say that this score represents a *percentile rank* of 50. We also say that the person getting this score has a percentile rank of 50.

Just as we can translate a score of 7.5 into a percentile rank, so we can also translate any other score in the distribution into a percentile rank. The person who gets a score of 10 would exceed nineteen students (everyone except himself), or 95 percent of the group. He would have a percentile rank of 95.

Percentile ranks provide a very useful way of giving meaning to scores. You learn, for instance, that a student got 36 items right in a given test. You ask, "What does this mean? How good a score is this?" You are told that a person making this score would exceed 75 percent of the group taking the examination.

This gives you some idea of the student's ability, especially if you know something of the group taking the examination.

Many of the *norms* provided in published tests are given in the form of percentile ranks. When you find out how many items the student got right on this test, you consult the table of norms provided (see Chapter 10) and learn that this score corresponds to a percentile rank of (say) 38. This means that the student getting this score would just exceed 38 percent of the group on which the norms are based.

The procedure for calculating percentile ranks is demonstrated in Table A.2, using the scores of the twenty students in Group B.

TABLE A.2. Percentile Ranks for Scores on Spanish Words, Based on Students in Group B

1 *Score (Words Correct)*	*2* *Number of Students Getting Each Score*	*3* *Number of Students Falling below Each Score*	*4* *Percent of Students Falling below Each Score*	*5* *Number of Students Falling below Midpoint of Each Score*	*6* *Percent of Students Falling below Midpoint of Each Score*
10	1	19	95	19.5	97.5
9	4	15	75	17.0	85.0
8	5	10	50	12.5	62.5
7	4	6	30	8.0	40.0
6		6	30	6.0	30.0
5	3	3	15	4.5	22.5
4	2	1	5	2.0	10.0
3	1	0	0	0.5	2.5
	20				

To get a rough general idea of percentile rank, look at columns 3 and 4. From column 3 we see that no one got a score *lower than* 3, one person got a score *lower than* 4, and so forth. In column 4 these numbers are turned into percentages. Looking at a score of 8, we see that the corresponding percentage in column 4 is 50, meaning that 50 percent of the group fell *below* this score. We could use such a rough percentile rank to give some meaning to scores. To show what it means to get nine words right, we could point out that the person getting this score just exceeds 75 percent of his group.

The percentile ranks that appear in published norms are based on the *general* idea used in our illustration. Such published percentile ranks, however, include a number of refinements to make the figures more precise. Obviously, such norms would be based on many more cases. Furthermore, it is assumed that, with a precise measure, we would not have (say) four people getting exactly a score of 7. A much more accurate measure would probably show a range of scores (6.8, 7.1, 7.2, etc.) clustering around 7. The published percentile ranks, therefore, show the percent of people below the midpoint represented by a given score. For these and other reasons, such published norms never quite reach 100, nor fall as low as 0, although they may get very close to 100 (99.999) or very close to 0. Columns 4 and 5 show what these more precise percentile ranks would look like for our twenty students. If we had several thousand students intead of twenty, the differences between columns 3 and 5 would be less marked.

Measures of Dispersion

One of the most interesting things in the comparison of our two groups is the much greater dispersion, or spread, in Group B. Whereas the students in Group A form a tight cluster ranging over only a few points, those in Group B cover a wider range of scores.

Range

To compare the dispersion or spread in the two groups we could use the *range*. This is simply the difference between the highest and lowest score. The range for Group A is 4, for Group B, 7. The range, however, like the median, is greatly at the mercy of one or two scores. It is relatively insensitive, however, to changes in other scores. If the poorest student in Group A had happened to get a score of 3 instead of 5, the change in the score of this one student would increase the range from 4 to 6. On the other hand, the range would in no way be affected by extensive changes near the midpoint.

Standard Deviation

To avoid this difficulty, most statisticians use the *standard deviation* as a measure of dispersion. Unlike the range, this measure is influenced by every score. A change in one score would affect it a little, but only a little. The standard deviation indicates, on the average, how far each student's score departs from the mean. In Group A we note that four students are right at the mean. For them, the deviation from the mean is 0. Two students deviate by one score in the positive direction. One student is two steps above the mean. Similarly, two students are one step *below* the mean, and one student is two steps below.

So much for the individual deviations. The standard deviation is intended to give a general picture of these individual deviations. To obtain the standard deviation we simply collect all the individual deviations, including the 0 deviations, and average them. This average shows, in general, how the individual scores tend to depart from the mean.

In this process of averaging the individual deviations there is one complication that we must mention. In adding all the deviations together to get the average, we would find the plus deviations (those above the mean) and the minus deviations would always cancel each other out. (Remember that the mean *is* the point about which these deviations balance.) To prevent this from happening, all deviations are squared before being added. Since $(-x)(-x)$ is x^2, all minus signs are thus eliminated. After averaging these squared deviations we take the square root of them.

In more extensive treatments of statistics you will want to know more about the ins and outs of this process of computing a standard deviation. For our purposes, however, you should regard it merely as a sort of average of the individual deviations. Each student's departure from the mean is noted and these individual departures are averaged to show in general whether the students tend to cluster closely around the mean, as in Group A, or whether, in general, they depart quite widely from the mean, as in Group B. The standard deviation for Group A happens to be 1.5 and that for Group B, 1.9.

Comparable Scores

The standard deviation has turned out to be an exceptionally useful measure. For one thing, it is an extremely convenient method of comparing scores in different traits. We know, for instance, that ten-year-old George is below average in both height and weight. More precisely, we know that he is only 4 feet 6 inches tall, whereas the average for his age is 4 feet 8½ inches. We also know that he weighs only 70 pounds as compared to an average of 85. He is thus 2½ inches below the average in height, and 15 pounds below the average in weight. But now we want to know if his deficiency in weight is excessive or whether this is just about what we might expect in view of his short stature. Is he farther behind in weight than he is in height? How does 2½ inches compare with 15 pounds?

We could, if we wished, use percentile ranks to answer this question. Suppose, in looking at the norms for ten-year-olds, we find that 4 feet 6 inches represents a percentile rank of 16, whereas 70 pounds represents a percentile rank of 12. From these it would appear that George surpasses 16 percent of ten-year-olds in height, but only 12 percent of ten-year-olds in weight. If we took this difference seriously we would decide that George is slightly farther behind in weight than in height.

As another rough-and-ready device, we might use the range. Discovering that the range in height for ten-year-olds is 15 inches, we could note that George falls below the group average by ⅙ of the range. Similarly, if the range in weight turned out to be 65 pounds, we would note that in weight he falls below the average by slightly more than ¼ of the total range.

But the range, as we have seen, is not a dependable measure of spread or dispersion. Change a single score and you could change the range quite markedly. It is much safer to use the standard deviation. And most comparable scores are based on the standard deviation or on something closely related to it. Suppose in our earlier illustration we find that the standard deviation for height is

2.4 and that for weight it is 15.6. Here we would note that George is just about 1 standard deviation below the average in both height and weight. Using this method of reckoning, we would conclude that he is no farther behind in one than in the other.

Z-scores or Sigma Scores Speaking technically we would say that George had a z-score of −1.0 in both height and weight. A boy right at the mean would have a z-score of 0.0. A weight 2 standard deviations above the mean is equal to a z-score of 2.0. In the typical distribution, 98 percent of scores will be found between z-scores of −3.0 and +3.0. Notice that these z-scores come in the form of both positive and negative numbers. Notice, also, that the numbers themselves are small and that, to describe minor changes, we would often have to resort to fractions such as −1.8 or 2.63.

Standard Scores To avoid the negative numbers and the awkward fractions that appear in z-scores, most publishers modify these scores in some way. Many of these are described as *standard scores*. Obviously, there would be no relative change in the scores if we added the same number, say 50 or 100 or 500 to each score. Obviously, also, no unfairness would result if we multiplied each score by any convenient number, say, 10 or 15 or 100.

In Figure A.1 we see a number of the more frequently used standard scores. These are shown in relation to percentile ranks and also in relation to the normal curve and to the *stanine scores* described later.

One form of standard score is the *T-score*, in which each sigma score or z-score is multiplied by 10, and to which 50 is added to each of these increased scores. As a result, such scores have a mean of 50. About 98 percent of all T-scores will fall between 20 and 80. Obviously, these values of 50 and 10 are quite arbitrary. Scores for the Graduate Record Examinations and the examination of the College Entrance Board, for instance, are treated differently. They are multiplied by 100 and have 500 added to them. This produces a mean of 500 and a range of from 200 to 800 for 98 percent of the scores.

Figure A.1 shows how these two forms of standard scores differ from the percentile ranks. Most of the percentile ranks (from less than 20 to more than 80) are crowded into a space of 1 standard deviation on each side of the mean. Clearly, percentile ranks near the extremes do not mean the same as those near the center. In percentile ranks the difference between 98 and 99 is quite large; the difference between 48 and 49 is minute. To go from 1 to 10 we have to cover the same distance as to go from 30 to 70.

Intelligence Quotients As computed nowadays, the *intelligence quotient* is a type of standard score. With this score, however, the mean is set at 100 and the standard deviation at about 15 or 16. We say, "about" because this varies from one test to another. In the Stanford-Binet it is 16, in the Wechsler tests it is 15. In one similar military test, the General Classification Test, it is 20.

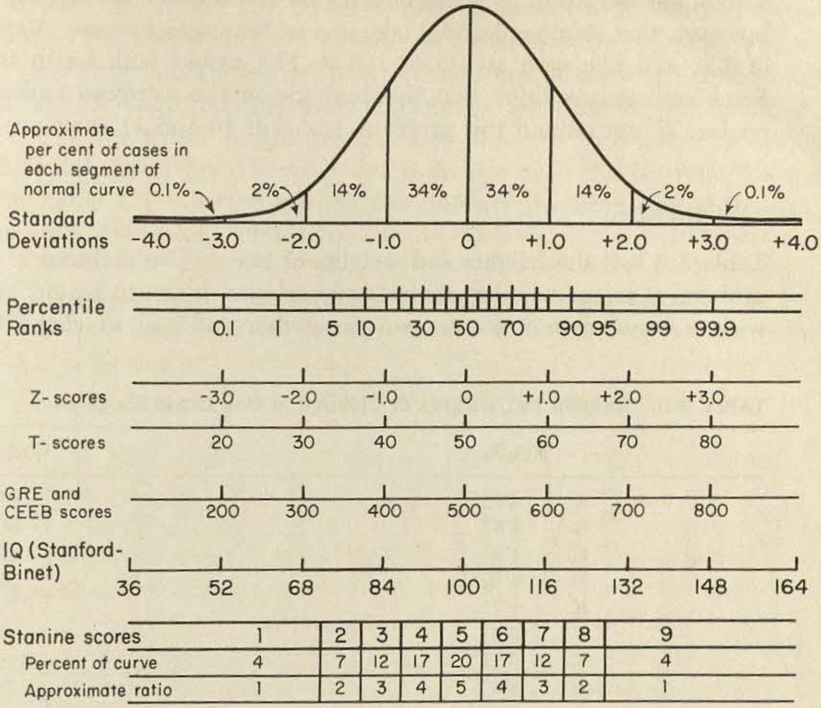

Figure A.1. Frequently used standard scores and their relation to the normal curve of distribution.

In using 100 as a mean, and 16 or thereabouts as the standard deviation, the IQ scales are trying to maintain some continuity with the older ideas of the intelligence quotient. When originally developed, the intelligence quotient was a true quotient and represented the ratio between the mental age and the chronological age. For the general population, these IQs happened to have a mean of 100 and a standard deviation of 16. Over the years, many people came to feel at home with these particular numbers, just as we feel at home with numbers like 6 feet or 2 hours or 18 dollars. Rather than force people to adopt new units of measurement, these new deviation scores were calibrated to fit in with the old measures.

Stanine Scores Stanine is one of the weird artificial labels we use so much these days. It comes from "standard nine." It was designed to get a standard score that would fit neatly into an IBM card. It was probably one of the first hints that everything of any importance just better had fit into an IBM card.

The boundaries between stanines are not computed from the standard deviation, but are set so as to include certain proportions of the normal curve. With a well-behaved normal curve, however, they end up as a type of standard score and can be read as such. Except for the extremes, each step corresponds to ½ of a standard deviation. A score of 5 represents a band around the mean. Notice, however, that stanines 1 and 9 take in a wide range of scores. A child with an IQ of 130, and one with an IQ of 160 or 170, would both be in the 9th stanine. Some statisticians think that this lumping of the extremes makes the scale too coarse. To get around this problem, scales of 10 and 11 steps are also used.

Measures of Correlation

Table A.3 lists the heights and weights of twenty-five children in grade six. Our problem is to see whether there is any relation between height and weight. We wish to see whether or not the two go together, and if so, to what extent.

TABLE A.3. Heights and Weights of Children in One Grade-Six Class

	Height	*Weight*
A	4′10″	81
B	4′8″	86
C	4′8″	62
D	4′10″	91
E	4′7″	74
F	4′9″	94
G	4′11″	129
H	4′6″	72
J	4′10″	97
K	4′9″	88
L	5′0″	121
M	4′5″	63
N	4′5″	68
O	4′8″	75
P	4′8″	83
Q	4′4″	72
R	4′5″	70
S	4′7″	93
T	5′0″	90
U	4′10″	93
V	4′9″	91
W	4′10″	86
X	5′1″	93
Y	5′1″	99
Z	4′9″	104

Systematic Tables

The simplest way to get at this problem is to line the children up according to one of these variables (say height) and see if they also happen to line up with respect to the other variable. Notice that the heights go from 4 feet 4 inches to 5 feet 1 inch, or through a range of 9 inches. Quite arbitrarily, we break this range up into six class intervals as follows: 4 feet 4 inches–4 feet 5.99 inches; 4 feet 6 inches–4 feet 7.99 inches, and so forth, and use it as the basis for a frequency distribution. The first group will include all children 4 feet 4 inches and up to, *but not including* 4 feet 6 inches. Just to keep track of the original observations, we will, at this stage, identify each child along with his weight. Child A, for instance, is shown in the height group 4 feet 10 inches to 5 feet 0 inches, along with his weight of 81 pounds. After doing this for each child, we get the results shown in Table A.4. For convenience, the children are listed so that the heaviest children are at the top of each column.

TABLE A.4. Weight of Each Child Falling in Each Selected Height Range

			Z 104		
			F 94		
			V 91	G 129	
			K 88	J 97	
	Q 72		B 86	U 93	L 121
	R 70	S 93	P 83	D 91	Y 99
	N 68	E 74	O 75	W 86	X 93
	M 63	H 72	C 62	A 81	T 90
4′4″	4′6″	4′8″	4′10″	5′0″	5′2″
Mean Weight for each Column	68.2	79.7	84.2	96.3	100.7

Notice that in constructing Table A.4 we arranged things so that the groups would differ systematically in height. We deliberately set things up so that all the children to the right will be taller than those to the left. Differences such as these are called independent differences, or differences in the *independent variable* (height, in this case): The term *independent* refers to the fact that these differences do not "depend on," or arise from, the differences in weight. The differences in height would appear (because we arranged things this way) even if there were no difference in weight.

By arranging things this way we make sure that there will be differences in height. But do we at the same time automatically make sure that there will be differences in weight? By no means. In spite of all of our doings it might turn out that, on the average, the children in each of our height groups would have the same weight. Whether or not this will be true *depends* on the relation between height and weight. Weight then is a *dependent variable*. Differences might turn up or they might not. It depends.

Simple Inspection

In our particular illustration, as seen in Table A.4, do we, in fact, find differences in weight as we move from left to right? From simple inspection it would appear that we do. We get the impression that, on the average, the groups to the right are heavier than those to the left. But most of us would not be happy with ordinary inspection. The answer would be clearer if we found the mean weight for each height group. These mean weights appear in the last row of Table A.4. Looking at these averages, we feel no doubt that when groups are arranged so that they are made to differ in height, then it turns out that they actually do differ in weight as well.

Before developing this matter further, let us tidy up Table A.4 a bit. This table gives us the necessary information, but it is awkward and calls for intensive reading. It does not give much information in one quick glance. The picture would be clearer if we turn each column into a frequency distribution *for weight*, as in Table A.5. To show the relation with Table A.4, the identifying letters are retained in Table A.5. These are not really necessary, however, and an even neater arrangement is shown in Table A.6. Here the identifying letters are omitted, and in each cell we merely see the *number* of children who have that particular height and that particular weight.

TABLE A.5. Correlation Chart of Height and Weight (Identifying Letters Included)

	Height in Feet and Inches						
Weight in Pounds	4'4"	4'6"	4'8"	4'10"	5'0"	5'2"	Total
120–130				G	L		2
110–120							
100–110			Z				1
90–100		S	F, V	J, D, U	T, X, Y		9
80–90			B, K, P	A, W			5
70–80	Q, R	E, H	O				5
60–70	M, N		C				3
Total	4	3	8	6	4		25

Slope as an Index of Relation

Any one of the tables would show that weight differences are found when children are sorted according to height. To get a more vivid picture of this relation we could make a graph by plotting the average weights for each column. (These averages appear in Table A.4.) Such a graph is shown in Figure A.2. Here we see that the graph slopes upward (weight) as it moves from left to right (height).

By taking a few precautions, the slope of the graph in Figure A.2 can be used to show the *amount* or *extent* of the relation between height and weight. Since our graph wanders around a bit, we will find it better to get an average, or overall slope. We could approximate this very well by stretching a black thread and moving it around until it came as close as possible to all the points on the graph, thus getting a straight line, shown as the lighter line in Figure A.2. By

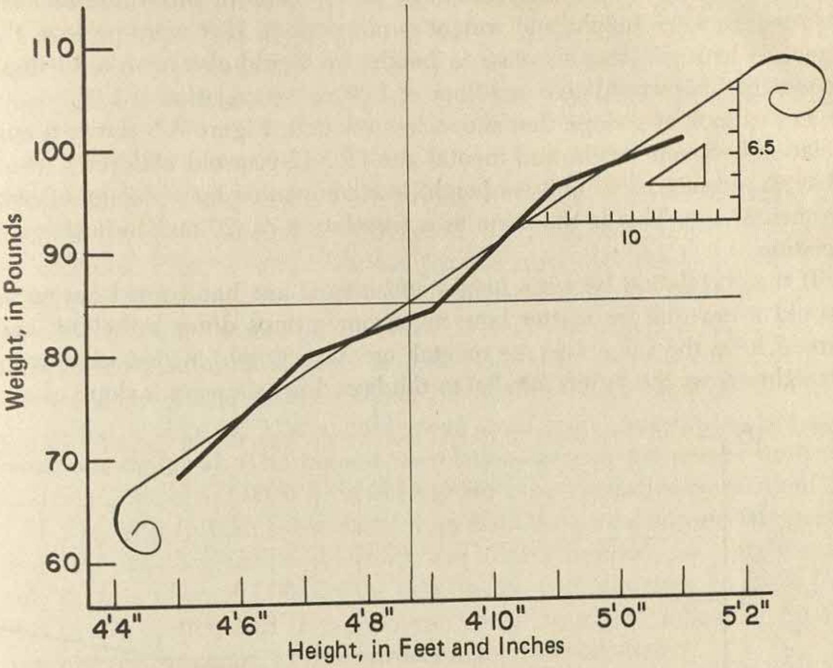

Figure A.2. Correlation considered an average slope.

looking at the scale at the upper right, we can see that every time we *arrange for* an increase of 10 steps in height, it turns out that we *get* an increase of about 6.5 steps in weight. Our line, therefore, has a slope of 6.5 in 10, or .65. Provided that we have arranged for the necessary precautions, we can consider this slope

TABLE A.6. Correlation Chart of Height and Weight (Identifying Letters Omitted)

Weight in Pounds	4'4"	4'6"	4'8"	4'10"	5'0"	5'2"	Total
130				1	1		2
120							
110			1				1
100		1	2	3	3		9
90			3	2			5
80	2	2	1				5
70	2		1				3
60							
Total	4	3	8	6	4		25

Height in Feet and Inches

of .65 as a *coefficient of correlation* of .65. A slope of this value means that the relation between height and weight is not perfect. If it were perfect, then every time we had a 10-step increase in height we would also have a 10-step increase in weight. This would give us a slope of 1.00, or a correlation of 1.00.

Let us look at a slope that shows less relation. Figure A.3 shows a comparable relation between height and mental age (for 12-year-old children). Here we see that an increase of 10 units in height is accompanied by a change of only 2 units in mental age. This is the same as a correlation of .20 and indicates a very low relation.

If the correlation between height and mental age had turned out to be zero, it would mean that no matter how much our groups differ in height, each group would have the same average mental age. Our graph, in that case, would move straight across the figure parallel to the base line, showing a slope of zero.

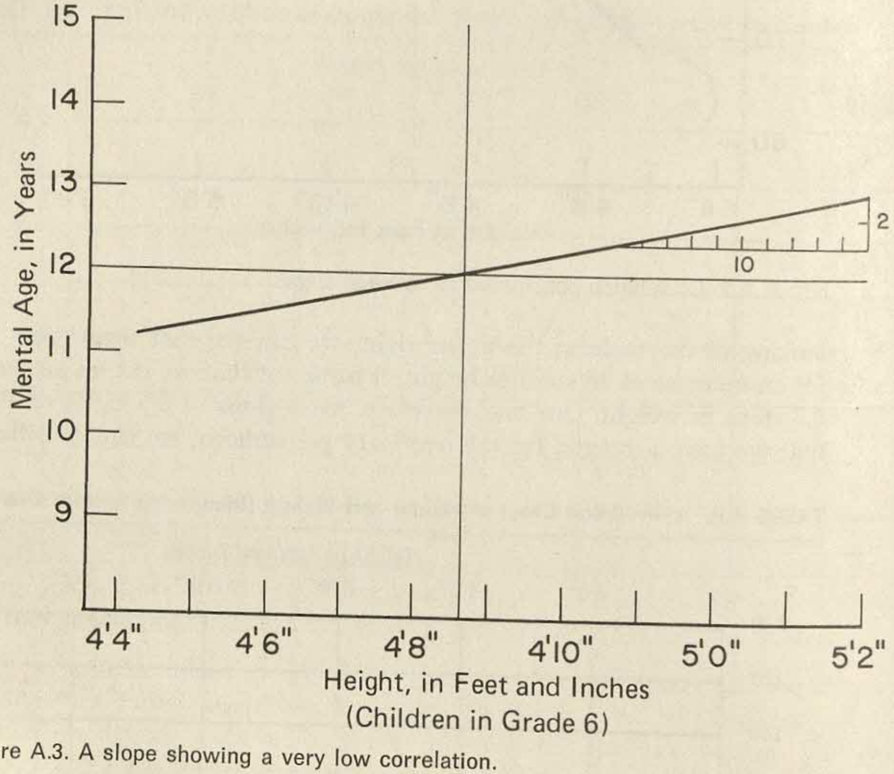

Figure A.3. A slope showing a very low correlation.

A slope, or correlation, can be negative as well as positive. At the elementary school level, for instance, we would probably find a negative relation between age, on the one hand, and amount of illness (days absent from school), on the other. If we sorted children according to age we would find that as we moved across from younger to older students there would be fewer and fewer days absence. This would produce a negative slope.

Try to think of a coefficient of correlation as a ratio which indicates the steepness of the graph. A correlation of .65 between height and weight does not mean that 65 percent of people will match up in height and weight, or that we will have a 65 percent success in estimating weight from height. It merely means that a change of 1 unit in height will be accompanied by a change of .65 units in weight.

Precautions in Interpreting Correlations as Slopes To use the slope of a graph as an index of the amount of correlation, we must, as we mentioned, take several precautions. First, we must use comparable scores for the two traits (height and weight in this case). We could not expect the slope to mean much if we used just any arbitrary scores or measures. Second, the steepest slope we can use to indicate correlation is a slope of 1.00. This may seem peculiar at first glance. Since a slope of 1.00 means a higher correlation than a slope of .50, then it might seem that a slope of 1.50 should mean even more correlation. But it does not work out that way. The highest correlation we can get comes from a slope of 1.00 or a slope of —1.00, if it should happen to be a negative correlation.

If you wish to take these matters on faith, you can stop at this point, merely remembering that comparable units are always implied, and that the rule holds only up to a slope of 1.00. On the other hand, you may want to know the ins and outs of the matter, and if you do you should read the following brief explanation, and also, perhaps, a more advanced book on statistics.

Meeting the Problem of Comparable Scores Such units as inches and pounds are quite arbitrary. We could not expect to get the same slope, for instance, if, instead of inches and pounds, we used millimeters and ounces. To get around this problem of arbitrary units, we make use of standard scores of the type discussed earlier (Fig. A.4). To show where a student stands in height, we show how far he is above or below the average for his group, and we do this in terms of standard deviations or z-scores. We say that in height this student is 1.8 standard deviations above the mean, or that he has a z-score of 1.8. In a similar way, we say that he has a z-score of, say, 2.3 in weight.

Under these arrangements each unit is expressed in terms of its own standard deviation. In our example, the standard deviation for height is 2.4 inches, and the standard deviation for weight is 15.6 pounds. In this group, to move through 2.4 inches of height is about the same thing as to move through 15.6 pounds of weight. For this reason, the scales are arranged so that 2.4 inches on the horizontal dimension covers the same space on the chart as 15.6 pounds on the vertical dimension.

The Maximum Possible Slope Now we turn to our next question: Why does a slope of 1.00 mean a higher correlation than a slope of 1.50 or a slope of 5.0? Actually, if we were only interested in the changes in weight that go with changes in height, a slope of 5.0 really would be more impressive than a slope of 1.00. But, typically, we are not exclusively interested in the changes in weight that accompany changes in height. Often we are also interested in knowing

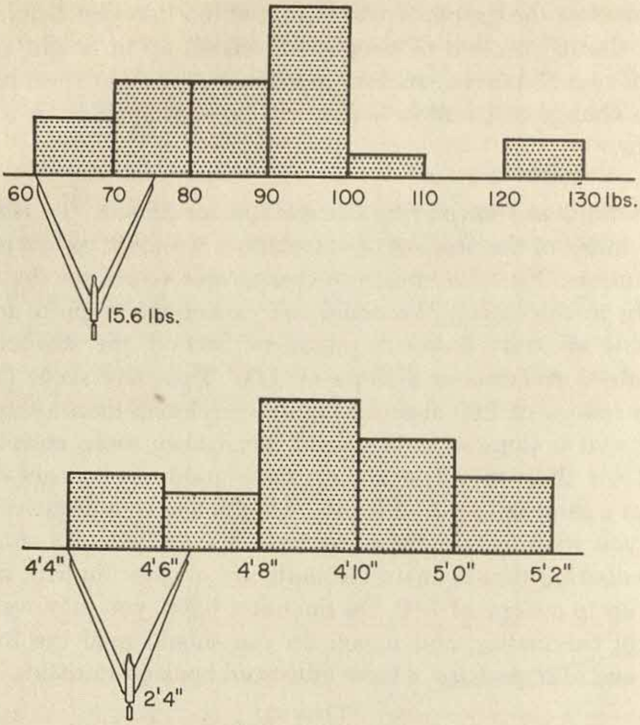

Figure A.4. The two distances must be stepped off in comparable units.

what sort of changes in height we would get if we moved from lighter to heavier children. With this question in mind, consider the slopes in Figure A.5. The slope of 5.00 shows that for each increase in height we get a tremendous increase in weight. But suppose we read the graph the other way. Starting from the origin, or point of intersection, we move up 10 units in weight. Now we move to the right along the height dimension until we come to the sloping line. Notice that for this increase of 10 units in weight we get an increase of only two units in height. In other words, in moving past a slope of 1.00 to a greater slope, we have, it is true, suggested more pronounced changes in weight for each change in height, but in so doing we have reduced the change in height that goes along with each change in weight. Since the coefficient of correlation must reflect both aspects of this relation between height and weight (it is, in fact, an average of these two relations), the very best relation it can show is indicated by a slope of 1.00.

Other Interpretations of the Coefficient of Correlation

Often, in describing quantities or amounts, you are not limited to a single approach. In describing the amount of water in the local reservoir, for instance, you could say how far the water is from the top or how far from the bottom.

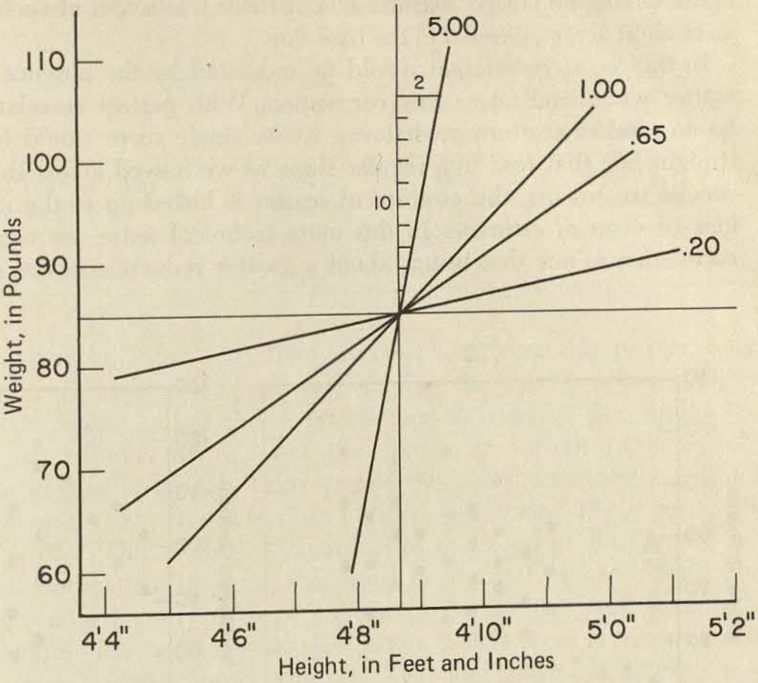

Figure A.5. A slope of 1.00 represents the highest possible relation if both aspects of the relation are taken into account.

You could also state the volume in terms of gallons or acre-feet. Perhaps you might find "day's use" the most convenient measure. One of these is just as accurate as the other, and any one could be translated unambiguously into any other. Which will be the most useful depends on circumstances and on the previous experiences of the one receiving the information. You could also be influenced by the sheer preferences of the persons to whom you are speaking.

The coefficient of correlation is such a measure. It can be described in different ways. Although each tells the same story, different descriptions may appeal to different people.

Reduction in Scatter Instead of thinking of a coefficient of correlation as a slope or as an average of two slopes, we could think of it as describing the reduction in the amount of scatter. A correlation chart, such as that shown in Table A.6, typically shows a good deal of scatter. In any one column we have several entries scattered over quite a few rows. This is shown more simply in Figures A.6a, and A.6b. In both figures the scores or dots are scattered over a good deal of the chart. In Figure A.6a, however, the scores fall in a somewhat limited area. This area can be represented by a relatively thin ellipse. The axis of this ellipse slopes upward. In Figure A.6b, on the contrary, the scores cover much more territory. A line drawn around these scores would describe a fatter figure having no clearly marked axis. If there was a hint of such an axis, it would go straight across, parallel to the base line.

In this view, correlation would be indicated by the absence of scatter. Wide scatter would indicate a low correlation. With perfect correlation, there would be no random scattering whatever. Every single score would fall precisely on a straight line that rose in a regular slope as we moved across the figure. In more precise treatments, this concept of scatter is linked up to the more fundamental idea of *error of estimate*. In this more technical sense, we can think of a high correlation as one that brings about a greater reduction in this error of estimate.

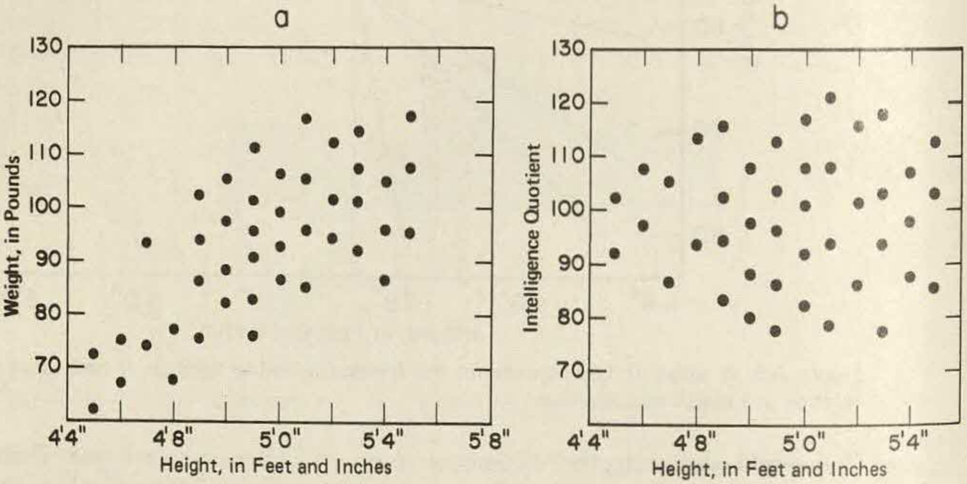

Figure A.6. Correlation indicated by the lack of scatter.

Difference in Percents Taking a different look at this same coefficient of correlation, we can visualize a simple arrangement such as that shown in Table A.7. Here we are trying to see if there is any relation between age and days of absence due to illness. To get an idea of the extent of the relation we need merely get the percent of each age group that had absences due to illness. We note that 40 percent of older children had one or more illnesses, whereas 70 percent of younger children came in this category. The difference in the percents is —30, the minus sign indicating that the older the child the fewer days of illness.

This difference of percent of —30 is quite comparable to a coefficient of correlation of —.30, except, of course, for the location of the decimal point. Like the coefficient of correlation, this difference in percents could range from 100 to —100. If the two groups were exactly comparable in illness, the difference in percents would be 0.

To see how the difference in percents compares to the regular coefficient of correlation, let us look at the data for the height and weight of 12-year-olds.

TABLE A.7. Days of Illness in Relation to Age

	Number of Children with No Illness	*Number of Children Ill One Day or More*	*Total Number of Children*	*Percent of Children Ill One Day or More*
Children 13 Years or Older	1200	800	2000	40%
Children under 13 Years	900	2100	3000	70%
Total	2100	2900	5000	
Difference in Percent				−30

This is shown in Table A.8. Here, instead of giving the precise height and weight for each child, we merely ask whether the child is above the median of the group in height (a tall child), or whether he is below the median in height. We also ask whether he is above the median in weight (a heavy child), or below the median in weight. Then we find out what percent of tall children are also heavy and what percent of short children are heavy. The *difference* in these percents is 66.7. This is quite comparable to the slope of .65 that we got when we treated the relation by using the actual height and weight of each child.

You may find it easier to think of correlations in this way than to think of them as slopes of lines. You learn, for instance, that there is a correlation of .55 between score on the Presto Aptitude Test and freshman grades in college. What does this mean? Think of the students divided into two groups, those above average on the Presto and those below average. Then ask how many from each of these groups "did well" as freshmen. Some of the low Presto group, of course, would do well as freshmen. But however many of this low group did well, there would be 55 percent *more* of the top group doing well according to the same criterion.

Precaution in the Use of Difference of Percents Many students will merely wish to use the difference in percents as a rough general way of interpreting correlations. If you are in this group, you can leave the matter at this stage. It is

TABLE A.8. The Relation between Height and Weight for Twelve-year-old Children

	Number of Children below Median in Weight	*Number of Children above Median in Weight*	*Total*	*Percent of Children above Median in Weight*
Number of Children above Median in Height	2	10	12	83.3
Number of Children below Median in Height	10	2	12	16.6
Total	12	12	24	
Difference in Percent				66.7

possible, however, that you want to give this concept more thought. In that case, there are some cautions to keep in mind. In the first place, to make this concept strictly comparable to the coefficient of correlation, we should work it both ways. For our rough purposes we were content to find the difference in the percent of the two age groups having absences. To be more precise we should also find the percent of "no illness" children who were (say) older, (57.1 percent), and also the percent of "illness" children who were older (27.6 percent), and get the difference between these percents (29.5). This turns out to be quite comparable to the 30 percent we.got in our first calculation. But it does not have to be. If there is any difference we should take the average (the geometric mean, in this case) of the two differences. When thus treated more completely, this method becomes a genuine *tetrachoric correlation* and is called the *phi coefficient of correlation.* In our discussion of this idea of correlation, you will remember, we were concerned merely with a useful and general way of thinking about coefficient of correlation. If you are going to do any more with this measure of correlation you will find methods of computation that are much more efficient than the steps we have gone through.

When taking this method seriously, we should also remember that this rough way of sorting the data—ignoring actual ages and actual days of illness—tends to underestimate the relation. Ordinarily we would get a higher correlation if we made use of the whole range of numbers.

Making Inferences About Larger Groups

In almost any investigation we read about, we are not primarily interested in the group actually studied, but in a much larger group which, hopefully, the studied group represents. In one study, for instance (see the box on page 617), we saw the prevalence of neuroses in teachers compared to neuroses in the general public. The study was based on a sample of 379 rural teachers and 1405 rural people chosen from the general public. Our chief concern is not about these 379 anonymous teachers, many of whom may have left the profession by the time we set out to examine the study. We read this study in the hope that it will enable us to make some kind of estimate about teachers in general, or about rural teachers in general. To pick one of several results, for instance, we find that only 2.9 percent of the teachers would be judged to be seriously neurotic, whereas 11.2 percent of the general public would be so judged. If this is to mean anything at all we must wonder if rural teachers in general would have a similar advantage over their nonprofessional rural counterparts. Or is it possible that this is a coincidence which just happens to hold for this particular sample? Naturally we would not be surprised to find some error. Any single *sample* may easily fail to tell the true story about the larger group, or what we call the main *population.*

The Problem of Error in Sampling

Typically the only thing that the investigator really knows about is a sample. From his knowledge of this sample he then tries to make inferences (or estimates, or guesses) about the large population he is really interested in, but will never be able to observe at first hand. To get a better illustration of errors in sampling, however, we will start with a fictitious situation in which we already know about the general populations. For our known "populations" we will use two packs of playing cards—A and B—each being a standard deck. From each of these known "populations" we will draw a *sample* of ten cards, and then calculate the arithmetic mean of the values, assigning the Jack a value of 11, the Queen 12, King 13, and Ace 14. For the other cards we use the given numerical value. We know that the mean value for each of the whole "populations" is 8 (416 ÷ 52). Any sample having a different mean would be in error to that extent.

Table A.9 gives one set of results for twenty pairs of samples. Each pack was shuffled and ten cards were drawn from each, and the average for each of the two samples was obtained. The cards were then replaced, both packs shuffled, and two other samples of ten each were drawn for a second comparison. If the samples were perfectly accurate every one of the forty averages would have a value of 8, and all the differences between samples would be zero. In subtracting B from A we get actual differences, ranging from +6 in comparison *IV*, to —5 in comparison *XI*. Most of the differences, however, are small, six of them being zero. The differences are shown in the form of a frequency distribution in Table A.10, and also appear graphically in Figure A.7.

The differences largely cancel each other out and the average of these differences is only one-tenth of a point from zero. Six of the differences actually are zero. Eleven of the twenty differences are within one point of zero. Some of the differences, however, are much larger. To get a general picture of the spread we have computed the standard deviation (Table A.9) by *squaring* the deviations from the mean (which we can regard as zero), finding the average (5.8), and taking the square root of the average (2.4). Two dots are placed on Figure A.7 to indicate the distance of one standard deviation each way from the mean. Between these dots there are almost fifteen cases, or a little less than 75 percent. Theoretically (Figure A.1) this area should include 68 percent of the cases. The theoretical value of 68 percent is a better measure to use, since our illustration could be in error.

Our illustration shows what is likely to happen when we have two identical populations and draw a number of random samples from each. Obviously there is no difference in the means of the two populations. (This is often described as the *null* situation.) Any differences in our samples must reflect sampling errors. Most of these errors, as we have seen, tend to be small, two-thirds of them (really 68 percent) falling within one standard deviation of zero difference. But

TABLE A.9. Illustration of Pairs of Random Samples Drawn from Identical Populations

Pair or Comparison	*Mean Value of Samples*		*Difference (A − B)*			*Square of the Difference*
	Pack A	*Pack B*	+	−	*0*	
I	9	8	1			
II	9	9			0	
III	8	10		−2		4
IV	12	6	6			36
V	7	8		−1		1
VI	7	7			0	
VII	10	8	2			4
VIII	8	8			0	
IX	11	10	1			1
X	6	7		−1		1
XI	5	10		−5		25
XII	9	9			0	
XIII	8	11		−3		9
XIV	6	6			0	
XV	8	5	3			9
XVI	7	11		−4		16
XVII	7	5	2			4
XVIII	10	9	1			1
XIX	8	8			0	
XX	5	7		−2		4
Total	160	162	16	−18		116
Mean	8.0	8.1	0.8	−0.9		5.8
Standard Deviation of Differences $= \sqrt{5.8} = 2.4$						

that is only true for most of the errors. Theoretically 4.5 percent of them should be greater than two standard deviations from zero, and one in 350 would exceed three standard deviations.

Reasoning from Sample to Population Our little illustration represents a fictitious situation. No one would bother drawing samples from a population if he already knew all he wanted to know about that population. In real life, moreover, we seldom have a large number of independent samples, from the same population, and if we do, we combine them into one supersample to give a more dependable picture of that population. In our example of neuroticism in teachers, for instance, we had one sample of 379 teachers and another sample of 1405 people drawn from the general public. On the basis of one sample from each population, we try to estimate any possible differences between those populations.

To illustrate the situation that exists in an actual situation, we again use playing cards as our population. In this illustration, however, you are given, not a known pack of cards, but one that you have never seen before. It may be a standard deck, or it may be a special deck (such as a pinochle deck) from which some cards may be missing. By drawing one sample from this new deck,

TABLE A.10. Frequency Distribution of Differences in Means of Samples

Difference in Means (A — B)	*Frequency*
6	1
5	
4	
3	1
2	2
1	3
0	6
−1	2
−2	2
−3	1
−4	1
−5	1
Number of Samples	20
Mean Difference	−0.1

you are to decide whether or not the whole pack (population) differs from the standard deck. You draw a sample of ten cards, to take an arbitrary number, and discover that the average value is 11.5 rather than the value of 8 for the standard deck. From this *sample* you are asked to decide whether or not this new deck, as a whole *population*, differs from the standard deck.

In spite of the fact that the mean of this sample differs from the mean of the standard deck, there is still the possibility that if you examined the whole population of the new deck, you would find that it did not differ from the standard (the *null* situation). Looking back at Table A.9 you will see that when two packs are identical it is still *possible* to draw two samples that will differ by

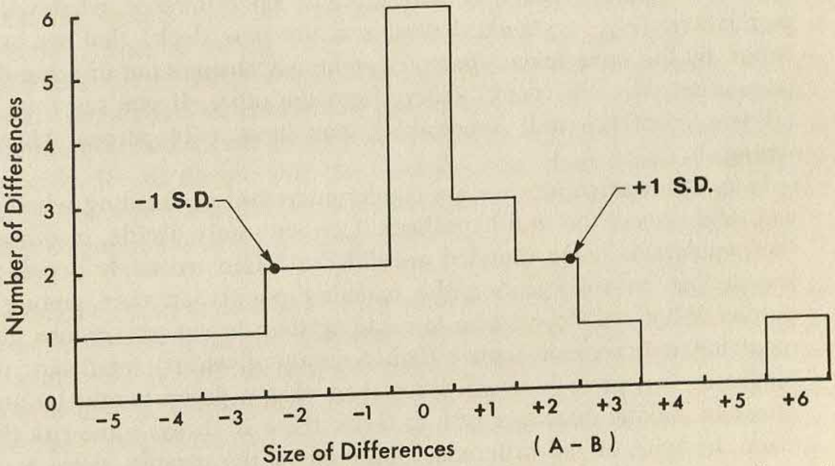

Figure A.7. Distribution of differences between samples drawn from identical populations.

more than the 3.5 points now before you. Comparisons *IV*, *XI*, and *XVI* all produce differences of 4.0 points or more. Yet these were drawn from identical packs. With a standard deviation of 2.4, as a matter of fact, there is a theoretical expectation that 14 percent of all comparisons would produce differences of 3.5 or more. If the new pack were exactly the same as a standard pack, there are fourteen chances out of a hundred ($P = .14$) that we would get a difference of 3.5 in a random sample.

Now get yourself firmly established in Piaget's stage of the formal operations and prepare for some hypothetical, or "iffy," thinking. First of all, consider the hypothesis that this new pack does not differ at all from the standard pack (this is the null hypothesis). If this null hypothesis is true, there is a probability of .14 that we could get one comparison of samples which would show a difference of 3.5 or more. Now, we *did* get a comparison showing a difference of 3.5. Consequently there is a probability of .14 that our new pack does not differ at all from the standard pack (that the null hypothesis *is* true). From all the samples we *might have drawn* for our comparison (see Table A.9), it is possible that we just happened to draw one that is likely to occur in fourteen cases out of one hundred.

Risks in Rejecting the Null Hypothesis

There are fourteen chances out of one hundred that there is no difference (null hypothesis) between this new pack and the standard pack. Obviously then, there are eighty-six chances out of a hundred that there is *some* difference (that the null hypothesis is wrong). And that is about as far as the statistician can take you. He can tell you that in spite of the observed difference of 3.5 between the samples compared, there are fourteen chances out of a hundred that the null hypothesis really holds and that there is no difference whatever in the two populations (e.g., a standard deck and the new deck) that we want to know about. By the same token, there are eighty-six chances out of a hundred that one population (the new deck) differs from the other. If you say they are different (if you reject the null hypothesis), you have a 14 percent chance of being wrong.

In most investigations we are chiefly interested in deciding whether or not we can safely *reject* the null hypothesis. Can we safely decide, in other words, that the populations being sampled are different? Can we safely decide that there is less serious neurosis among the teaching population than among the general public? What risk do we take in deciding that, *in general*, groups given the new medicine will recover *sooner* than a group given no medicine; that a group taught by this procedure will learn more than a group taught by another procedure? In making decisions such as these, there is always some risk that we are in error. In spite of the difference observed in the sample, there is always some probability, some risk, that if we examined the large populations, instead of the samples, we would find no difference at all.

The Concept of Significance In reading about these general questions you will often come across the word "significant." After reporting a difference between his samples, for instance, the investigator will often tell you whether or not this difference is significant for the larger populations. A difference between *samples* is considered to be significant whenever we feel we can safely assume that the larger *populations* would also show some difference. More accurately, the difference (or other measure) is considered significant when we are prepared to accept the *risk* of deciding that some difference would appear in the larger populations. Such decisions, of course, always carry some risk. But we may judge a particular risk to be *insignificant.*

It is perhaps unfortunate, by the way, that the word "significant" has come to be used in this technical sense. On hearing that a difference is significant, many people would gather that the difference is important, or that it should be given serious attention. Actually, in a practical sense, such a difference might be quite trivial. Measuring a very large sample of children born in June, for instance, you find the average IQ to be 101.6. Another large sample of children born in December reveals an IQ of 99.8. The appropriate statistical tests are carried out, and it is concluded that there is only one chance out of a thousand that this difference would shrink to zero if we tested *all* the children born in each of these months. Statistically, the difference is highly significant, in the sense that what it "signifies" for the larger population is highly dependable. In the practical sense, however, an IQ difference of this size is quite inconsequential. No one would really care whether the true IQ was 101.6 or 99.8.

Interpreting Statistical Significance An experimenter has compared the achievement in a group of ultramodern school buildings with the achievement in older, traditional buildings and has found a difference in favor of the modern plants. He reports that this difference is *significant at the 5 percent level of confidence.* That is to say, there are five chances out of a hundred that an examination of the large general "population" of modern plants, and the large general "population" of traditional plants, would reveal no difference whatever. There are five chances out of a hundred that, in the larger groups, the null situation holds. If you decide that the modern plant does produce better results in general, you stand a 5 percent chance of being wrong. By the same token, you have a 95 percent chance of being right.

Deciding on Acceptable Risks How serious would it be if you made a decision that has a 5 percent chance of being wrong? Or, to put it another way, how big a risk are you willing to take in making your decision? Here the statistician cannot help you. You yourself must worry about how serious it would be if you made the wrong decision. And this worry varies from one situation to another. Hearing that the chances of rain are only one in ten, for instance, you decide to act on the assumption that it will not rain. In this situation, nothing very serious follows from a wrong decision. In another situation you learn that this batch of one hundred cans of green beans contains one can contaminated by botulism. In using one can from this batch you have a 99 percent chance that everything will be all right. But there is a 1 percent chance of being wrong, and in this situation you would not want to be wrong. You would want the chances of being wrong to be much lower than 1 percent. How much lower? One chance in a million? In a hundred million? Remember, of course, that there is always *some* risk even though it may be very slight.

In the experiment on the effectiveness of different school plants, how serious would it be if you were wrong? You accept the 5 percent risk involved, in other words, and decide that *in general* the new plant is more effective. Then, much later, you find that you were wrong and that in general the new plant is no more effective than the old. Obviously some harm may have followed from this wrong decision, but there is nothing in statistics to tell you how much, or how much you should worry about it.

Ways of Describing "Significance"

When very serious consequences may follow from a wrong decision, you may want better and better odds, or, to say it another way, you may demand a higher level of confidence. Statisticians honor this need to some extent, and many of their tables are arranged so that you can be told if a difference is significant at the 5 percent level, at the 2 percent level, the 1 percent level, or even beyond the level of one chance in a thousand.

The levels of significance may be reported in a number of different ways. Instead of saying that this difference (or other measure) is significant at the 5 percent level, the investigator may merely report "The difference was 6.8 ($p = .05$)." He may also give the actual measure and then add $p < .05 > .01$, meaning that the probability is less than .05 but more than .01. These different forms mean the same thing. Each statement, if we may repeat, tells you your risk of being wrong if you decide that there is some difference between the larger populations which the samples, supposedly, represent.

At times an investigator will report lack of significance. He may merely state that the difference was not significant at (say) the 5 percent level of confidence. If he has committed himself to a given level of confidence, he may merely report "N.S." for not significant. Such negative statements imply that the investigator is reluctant to assume that there would be a difference between the two larger groups.

To say that you have a 5 percent chance of being wrong is not quite the same thing as to say that you are going to be wrong in 5 percent of your decisions. The latter phrasing suggests that you really are going to make a large number of decisions and can expect 95 percent of these to be right and 5 percent to be wrong. Typically, however, we do not contemplate making a large number of decisions. Typically, our worry is concerned with a single decision. We do not contemplate eating one hundred cans of beans. We have a hand on *one* can and are trying to decide about the risk of eating that one. We are not going to make a hundred decisions about the *general* merits of modern versus traditional school plants. We have to make *one* decision: that in general the modern is better, or that it is no better. In the same way, in drawing a single new card from the deck, you may remind yourself that there is one chance in four that this will be a spade. This does not imply that you will draw four cards. You are thinking of only one such draw, and these are the odds that apply to that single event.

Ways of Testing Significance

Upon reading a statement about the significance of a result, or about a probability value, most of us will have to take that statement on faith, hoping that the investigator has used the correct procedures. In this elementary discussion, we cannot go into details. We merely mention the general features of some of the techniques you will read about.

Parametric Tests In the illustrations involving decks of cards, we made use of the actual numerical value of each card to obtain a mean score for each sample. We also found the differences between means, and used the numerical value of each difference to obtain a standard deviation of the differences. In these *parametric* measures a big score, or a big difference, counts more than a small score, or a small difference. These measures are to be contrasted with nonparametric measures (see below) like the *median*. In the nonparametric measures, a large score carries no more weight than a small score, provided both exceed some critical value.

For parametric data, the investigator will often use either an *F-test* or a *t-test* to calculate a probability or to determine the statistical significance of his results. In these tests, as in our simple illustrations, he must make some estimate of the variation to be found between one sample and another. If we would expect much variation between samples, we will be all the more suspicious that the sample we did see may be very different from the whole population it is supposed to represent. Measures like F or t are also influenced by the size of the sample. Naturally, the larger the sample, the greater our confidence that the sample truly represents the larger population. These general concepts, so loosely stated here, are treated in explicit and precise fashion by statisticians, and the results are made available in the form of tables. Bringing his own data to these tables, the investigator determines a probability value, or an estimate of significance.

Nonparametric Tests In using nonparametric measures we ignore the size of the actual scores and ask only how many observations fall on each side of a critical cutoff point. As pointed out earlier, a measure that exceeds a critical point by a great deal has no more effect than one that just barely gets across the line. In looking at the emotional adjustment of teachers and the general public, for instance, we may decide that a score as low as, say, 34 means serious trouble. We then report that 2.9 percent of teachers and 11.2 percent of the general public reached this critical score or went beyond it. In giving these figures, we ignore the fact that in both groups some people may have had scores of 50, whereas others were as low as 34.

For another illustration of the nonparametric treatment of data, turn back to Table A.7. In this table we have merely sorted the children, first of all, into those age 13 or more, on the one hand, and those under 13, on the other. We have ignored any differences in ages within these two groups. Similarly, we sorted the children into groups with no illness as opposed to those with some illness, again ignoring the amount of illness within the latter group.

Table A.7 gives some results from a sample of 2000 older children, and from another sample of 3000 younger children. A comparison of *these samples* shows that the young children had more illness than the older children. But does this hold for the thousands of children not included in the samples? What is the chance that we would find no difference at all in illness if we looked at the larger population?

To get an answer to these questions we figure out the kind of results we should expect if there were no difference in the larger populations (the null situation). We then compare this *expected* result on the one hand, with the observed result on the other, and note the discrepancy. Looking at the entire group of 5000 children we see that 2100 of them, or 42 percent, had no illness. Now, if there were no difference between younger and older children (the null situation), we should expect that 42 percent of each group would have no illness. In line with the null situation, then, we should *expect* 42 percent of the 2000 older children, or a total of 840, to be in the "no illness" group. Similarly, we should expect 1260 (42 percent) of the 3000 younger children to be in this category. But the *observed* frequencies differ from these frequencies that are to be *expected* from the null situation. For the older children, the observed frequency of no illness is 1200 instead of the expected 840, making a discrepancy of 360. For the younger children, the observed frequency is 900 instead of the expected 1260, producing a similar discrepancy (−360), but in the opposite direction. Such a discrepancy is quite large, especially when either is considered in relation to the expected frequency itself. The larger the discrepancy in relation to the expected frequency, the greater our confidence that we would also find some difference in the illness of younger and older children if we examined the entire population. A very few large discrepancies would make us feel that we are taking little risk in reaching such a decision. If, on the other hand, the discrepancies were very small in relation to the expected frequencies, we would need many more of them to give us the same confidence that younger and older children really differ in this matter. Altogether our confidence is increased both by the amount of each discrepancy and by the number of such discrepancies.

In making use of the number of discrepancies, by the way, we would have to be sure that these were all independent of each other, and sometimes they may be tied together. You were probably intrigued to note that the two discrepancies we mentioned in connection with Table A.7 were both exactly 360. If you calculated the discrepancies for the other two cells you would find that these were also 360. With just four cells, this has to be. There are just 2000 older children. If more than we expect turn up in the first column, then there will have to be fewer than we expect in the second column. With a table as condensed as this one, we have only one independent discrepancy. The others are determined as soon as one is established. In a table with more cells, however, we could have a larger number of independent chances for a discrepancy to occur.

One widely used measure, *Chi-square* χ^2 gives an overall measure of the discrepancies between (a) the numbers of items expected in any given category and (b) the numbers actually observed. From (a) the size of this Chi-square, and from (b) the number of independent comparisons, the statistician can obtain a measure of significance. This would indicate the probability that in spite of the discrepancies in the samples there would be no discrepancy whatever in the larger populations from which the samples were drawn.

Summary

To deal with numbers in more efficient fashion, we can arrange them in frequency distributions and can calculate more precise measures such as means, medians, percentiles, and standard deviations. The frequency distribution gives a great deal of information in one eyeful, showing both the central trend of the data and the spread or dispersion. Either the mean or the median can be used when we need a single measure to describe the central tendency. The standard deviation is the favorite measure of dispersion.

Either a percentile rank or a standard score can be used to show where the individual stands within the distribution. Standard scores are frequently expressed as T-scores, or in other arbitrary forms such as IQs, or the scores used in the Graduate Record Examination.

Provided we keep a few cautions in mind, a coefficient of correlation can be regarded as a slope. This shows how much change we can expect in one variable (weight) whenever we arrange for systematic changes in another variable (height). A coefficient of correlation is also something akin to a difference in percents. (What is the percent of tall children who are heavy as compared to the percent of short children who are heavy?) A high correlation can be interpreted in terms of the scatter in a correlation chart—the higher the correlation, the less the scatter.

An investigator uses a limited sample for the purpose of making inferences about a larger population. Even if two populations of students (rural versus urban) are identical with respect to (say) height, any pair of samples may readily show a difference. The problem is to decide whether (a) any observed difference reflects a real difference in the population, or whether (b) there is really no difference (null hypothesis) in the two populations, the observed differences in the samples representing the familiar errors of sampling. Statistical devices (t, F, and χ^2) help us to decide our risk of being wrong if we decide that there is a difference in the large populations (if we reject the null hypothesis). This risk is usually expressed as a probability (.05, .02, .01). If the risk is so small that it can be ignored, we say that results of the samples have dependable statistical *significance* for the larger populations. There is always a problem of deciding when a risk can be considered insignificant or safe to ignore. When the consequences of a mistake would be serious, we demand that the risk (probability) be very small indeed.

Name Index

Italicized numbers give complete bibliographic references. Other numbers refer to page mention. For some authors, basic concepts, as opposed to specific references, appear under the respective names in the subject index.

Aborn, M., *168*; 159
Abou-Hatab, F. A. H., *287*; 267
Achenbach, T. M., *98*; 87
Adams, D. K., *455*; 440
Adams, J. A., *205*, *332*; 174, 303, 305
Adams, J. F., *490*; 467
Adams, J. K., *165*; 146
Adams, R. S., *25*; 18, 467, 544
Adelson, J., *490*, *524*; 467, 500
Adorno, T. W., *524*; 508
Ahlbrand, W. P., Jr., *576*; 538
Ahlstrom, W. M., *524*; 520
Akers, R., *490*; 484, 487
Allen, D. I., *247*; 218, 219
Allen, E. A., *25*; 9
Allen, J. G., *490*; 465
Allen, J. R., *490*; 487
Allen, L., *611*
Allender, J. S., *285*; 267
Allinsmith, W., *610*; 593, 596, 620, 626, 628
Allport, G. W., 145
Alper, T. G., *155*, *332*; 310
Altbach, P. G., *492*; 477
Amaria, R. P., *576*; 553
Amir, Y., *524*; 517
Amsel, A., *205*; 180, 201
Amster, H., *247*; 240
Anastasiow, N. J., *247*; 235, 237
Anderson, A. W., *25*, *410*, *635*; 14, 392, 624
Anderson, G. J., *576*; 548, 549
Anderson, R. C., *165*, *205*, *247*, *332*, *576*; 142, 190, 192, 195, 197, 225, 299, 547
Anderson, S. B., *285*; 266
Anderson, W. F., *524*; 504
Andre, T., *205*; 195
Appley, M. H., *166*; 137
Archer, N. S., *166*; 158
Austwick, K., *207*; 197
Ausubel, D. P., *59*, *247*, *332*, *383*, *490*, *576*; 41, 212, 217, 218, 229, 235, 299, 310, 311, 358, 475, 541

Bachtold, L. M., *285*; 278, 282
Back, K. W., *490*; 487
Bacon, M. K., *453*
Baer, D. M., *572*
Bahm, R. M., *449*
Bailey, J. S., *524*; 520
Baird, R. R., *98*; 88, 90
Baker, B. L., *207*, *580*; 197, 571
Baker, R. A., *332*; 326
Baldwin, A., *107*
Baller, W., *335*; 309
Balow, I. H., *395*
Bandura, A., *453*; 154, 426, 430, 431, 432, 480, 481
Banks, W. P., *332*; 304
Bany, M. A., *576*; 559
Bar-Yam, M., *410*; 400
Baratz, J. C., *59*; 57
Barber, T. X., *383*; 381
Barclay, J. R., *206*; 180
Barker, R. G., *610*; 594
Barr, J. A., *576*; 538
Barron, F., *285*; 272, 273
Barry, H., III, *453*; 416
Bartlett, C. J., *576*; 555
Bartlett, F. C., *285*; 252
Batchelder, W. H., *123*
Bauman, D. J., *247*; 218, 219
Baumrind, D., *453*; 450
Bayley, N., *56*, *80*, *98*; 80
Bealer, R. C., *490*; 477
Beam, K. S., *493*; 478
Becker, H. S., *635*; 624
Becker, W. C., *453*, *579*; 450, 569, 571
Bednar, R. L., *490*; 483
Bee, H. L., *98*; 88, 90
Beilin, H., *524*; 501
Bell, R. R., *490*; 475
Bellugi-Klima, U., *59*; 51
Belok, M., *635*; 626
Benne, K. D., *576*; 545
Bennett, H. L., *579*; 538
Benowitz, M. L., *165*; 158
Benschoter, R. P., *332*; 307
Benson, W. M., *528*
Bentley, R. R., *636*; 619
Bentz, W. K., *635*; 614, 617
Bereiter, C., *59*; 57
Bergan, J. R., *276*
Berger, A. S., *490*; 475
Berglund, G. W., *165*; 152
Berkowitz, H., *26*; 5
Berkowitz, L., *453*, *454*; 430, 444
Berkowitz, N. N., *527*; 510, 511
Berliner, D. C., *165*; 161
Berlyne, D. E., *149*, *165*; 148
Bernstein, B., *59*; 54
Bessell, H., *610*; 603
Bevan, W., *120*
Biddle, B. J., *25*; 18, 544, 576
Biggs, J. B., *527*; 519
Bijou, S. W., *59*, *205*; 42, 176
Biller, H. B., *449*
Bilous, C. B., *579*; 538
Binter, A. R., *247*; 222
Biran, L. A., *576*; 553
Black, A. E., *453*; 450
Bland, H., *490*; 487
Blank, M., *52*, *59*; 50, 57, 394
Block, J., *610*; 591
Blocker, C. E., *635*; 620
Bloom, B. S., *98*, *285*, *383*; 80, 94, 263, 341, 362, 364, 377
Bloom, M. H., *490*; 487
Bloomer, R. H., *165*; 144
Bonier, R., *527*
Borg, W. R., *410*; 394
Bousfield, W. A., *247*; 213
Bowen, R. O., *25*; 14
Bower, E. M., *610*, *611*; 585, 594, 596
Bower, G. H., *111*; 302
Bowman, P. H., *491*
Bracht, G. H., *410*; 400
Brackbill, Y., *205*; 177
Bradway, K., *81*
Braga, J. L., *411*; 397
Brandt, R. M., *383*; 358
Breed, F. S., *332*; 316
Brehm, M. L., *490*; 487
Broadbent, D. E., *116*
Broden, M., *578*
Broder, L. J., *285*; 263
Brodkin, A. M., *636*
Bronfenbrenner, U., *454*, *525*; 445, 448, 501
Bronson, G. W., *454*; 433
Brophy, J. E., *383*; 381
Broudy, H. S., *383*; 361
Brown, J. C., *206*; 180
Brown, J. L., *206*; 197
Brown, L. D., *577*; 547

Brown, M. H., *165*; 152
Brown, R., *59*; 50
Bruce, P., *604*
Bruner, J. S., *59*, *98*, *247*, *285*; 47, 57, 76, 210, 235, 253
Bryan, J. H., *454*; 443, 444
Buck, R. C., *627*
Buenz, R. Y., *332*; 309
Bugelski, B. R., *332*; 297, 302
Buhler, C., *112*
Bullis, H. E., *610*; 603
Burch, G. B., *635*; 632
Burchill, G. W., *525*; 520
Burden, L., *629*
Buros, O. K., *383*; 373
Burt, C., *356*
Burtt, H. E., *332*; 308
Bush, R. N., *411*; 401
Buss, A. H., *454*; 437
Busse, T. V., *165*, *610*; 158, 591, 606
Buzzeli, J., *285*; 280

Cadwallader, T. C., *332*; 297
Caffrey, B., *525*; 515
Calvin, A. D., *597*
Caplan, N., *384*; 365
Cardwell, J., *526*
Carithers, M. W., *525*; 517
Carlson, J., *167*; 156
Carpenter, T. R., *610*; 591, 606
Carter, L., *576*; 557
Carter, L. J., *98*; 96
Cartledge, N., *167*; 151
Cartwright, C. A., *165*; 158
Case, H. W., *207*; 197
Cashen, V. M., *248*; 219
Castaneda, A., *165*; 141
Cattell, R. B., *98*; 86
Cazden, C. B., *59*; 52, 53
Celler, *577*; 565, 566
Cervantes, L. F., *490*; 468, 469
Chan, A., *332*; 315
Chance, J. E., *454*; 441
Chapanis, A., *635*; 633
Charles, D. C., *332*; 307
Charters, W. W., Jr., *25*, *27*, *635*; 4, 5, 8, 9, 13, 16, 624, 626
Child, I. L., *453*
Choisy, M., *120*
Chomsky, N., *59*; 48
Chown, S. M., *285*; 262
Churchill, R., *162*
Clairborn, W. L., *383*; 381
Clark, D. C., *248*, *374*; 237, 241
Clark, K. B., *454*; 437
Clark, R. M., *412*; 397
Clark, R. W., *109*
Clifford, C., *612*; 605
Clymer, T., *411*; 397
Cochran, J. R., *411*; 394
Cofer, C. N., *166*, *286*; 137, 262
Cohen, B. H., *247*; 213
Cohen, S., *490*; 487
Cole, M., *59*; 57
Collins, J. R., *249*; 235
Conderman, L., *572*
Conklin, M. E., *525*; 519
Cook, D. R., *333*; 316
Cook, W. W., *411*; 397
Coop, R. H., *577*; 547
Cooper, E. H., *333*; 302
Coopersmith, S., *610*; 606
Copeland, L. C., *209*
Corsini, D. A., *146*; 147
Coslin, F., *525*; 513, 516
Costin, F., *577*; 547, 549
Coughlan, R. J., *635*; 619
Cousins, N., *383*; 366
Cox, F. N., *542*
Crabtree, C., *285*; 279
Craig, A. M., *209*
Crandall, V. C., *442*, *454*; 441
Crandall, V. J., *454*; 441
Crawford, B. M., *577*; 562
Crawford, T. J., *474*
Creelman, M. B., *248*; 212
Cremin, L. A., *166*; 157
Crofton, J. A., *333*; 326
Crooks, R. C., *525*; 517
Cross, H. J., *490*; 465
Crouse, J. H., *333*; 299
Crowley, M. E., *333*
Crutchfield, R. S., *286*, *577*; 282, 553
Csikszentmihalyi, M., *285*; 273
Cukier, L., *332*; 311
Cwalina, G. E., *490*; 486, 487

Daehler, M. W., *166*; 163
Davidson, R. E., *248*; 216, 225
Davis, G. A., *288*; 279
Davis, R. H., *206*; 197
Davis, T. N., *25*; 5
Day, R. H., *333*; 328
Deese, J., *59*, *166*, *333*, *335*; 48, 142, 298, 328
De Haan, R. F., *411*; 392
Dellas, M., *285*; 273
Denny, D. A., *287*; 282
Denny, M. R., *206*; 197
Deno, S. L., *26*; 5, 6
Dentler, R. A., *577*; 536
Department of Health, Education and Welfare (HEW), *490*; 458
De Roche, E. F., *285*; 282
Deutch, M., *59*; 41
Dick, W., *206*; 197, 198
Diederich, P. B., *383*; 347, 366, 367
Dollard, J., *454*, *455*; 429, 437
Dollinger, L. E., *248*; 216, 225
Dorner, J. L., *168*; 152
Douvan, E., *490*; 467
Dowling, F. R., *635*; 626
Drake, D. M., *98*; 88
Dreger, R. M., *98*; 90
Dressel, P. L., *285*, *611*; 267, 603
Drew, C. J., *333*; 321
Duerfeldt, P. H., *207*; 190
Duffy, E., *166*; 139
Duncan, C. P., *286*, *333*; 252, 262, 263, 265, 266, 323
Duncker, K., *286*; 262
Durkin, D., *396*
Dutton, B. E., *413*; 391

Ebel, R. L., *383*; 381
Eckstrand, G. W., *333*; 327
Eddy, E. D., *525*; 513
Edgerton, J. W., *635*; 614, 617
Educational Testing Service Developments, *365*
Edwards, A. E., *490*; 487
Eels, K., *27*, *637*; 13
Eglash, A., *525*; 513
Ehrlich, H. J., *525*; 507
Eigen, L. D., *206*; 198
Eisner, E. W., *383*; 361
Ekstrom, R. B., *411*; 394
Elkin, F., *491*; 477
Elliot, D. S., *454*, *491*; 468
Ellis, H. C., *333*; 299, 306, 312, 315, 324
Emmons, W. H., *166*; 142
Engelmann, S., *59*; 57
Ennis, R. H., *286*; 267
Entwisle, D. R., *25*, *59*, *333*, *383*; 12, 51, 299, 328, 376
Erikson, E., *120*, *491*; 119, 121, 420, 463
Erlenmeyer-Kimling, L., *98*; 94, 95
Espeseth, V. K., *333*; 321
Estes, W. K., *123*, *206*; 203
Eustace, B. W., *248*; 231
Evans, E. D., *25*, *166*, *491*; 21, 22, 95, 148, 157, 162, 401, 465, 603
Evans, F. R., *286*; 257, 281

Farber, I. E., *166*; 147
Farnsworth, D. L., *611*; 593
Farrell, M. E., *636*; 620, 623, 628
Fauble, M. L., *472*
Faust, G. W., *205*; 190
Fawl, C. L., *611*; 593
Feinberg, M. R., *577*; 536
Feldhusen, J. F., *206*; 197
Feldman, D. H., *206*; 199
Feldman, M. E., *206*; 197
Feldman, R. S., *249*
Ferguson, B. B., *613*; 594
Ferguson, L. R., *454*; 432, 450
Feshback, N. D., *601*
Festinger, L., *333*, *334*; 180, 201, 309
Fiedler, F. E., *577*; 550, 551
Fine, R., *120*
Finger, D. C., *612*; 593
Fink, C. F., *579*; 554
Finney, B. C., *411*; 390, 394
Flanders, J. P., *454*; 429, 430
Flanders, N. A., *25*, *577*; 18, 544, 545, 548
Flavell, J. H., *166*
Fleischmann, B., *455*; 435
Fleming, C. M., *411*; 401
Flynn, W. R., *491*; 487
Fogg, C. P., *413*; 394
Forlano, G., *206*; 185
Foster, H., *333*
Foster, J. C., *25*; 9
Fraiberg, S. H., *611*; 587
Francis, E. F., *525*; 504
Frank, S. M., *52*

Frase, L. T., *166*; 150, 158, 159
Frederiksen, N., *286*; 257, 281
Freeberg, N. E., *383*; 380
Freedman, M. B., *525*, *528*; 513
Frenkel-Brunswik, E., *524*
Freud, S., 121, 119
Friedman, S. T., *527*
Frommer, F. D., *165*; 148
Fruchter, B., *27*; 4
Fuller, F. F., *25*; 8, 9
Fullick, M. G., *206*; 180
Furness, E. L., *635*; 626

Gage, N. L., *105*, *636*; 632
Gagné, R. M., *166*, *248*, *333*, *383*; 163, 218, 219, 230, 232, 241, 305, 316, 358
Gaier, E. L., *285*; 273
Gaite, A. J. H., *332*; 299
Galanter, E., *123*, *132*; 124
Gall, M. D., *166*; 161
Garbin, A. P., *636*; 626
Garn, S. M., *37*
Garrett, H. E., *98*; 85
Garrison, K. C., *525*, *577*; 516, 568, 570
Gates, F. L., *636*; 626
Gates, M., *385*; 380
Gelfand, S., *286*
Gellert, E., *577*; 543
Gerlach, V. S., *383*; 363
Getzels, J. W., *285*; 273
Ghiselin, B., *286*; 255, 274
Gibb, J. R., *577*; 543, 545, 546
Gibbens, T. C. N., *491*; 478
Gibbons, D. C., *491*; 478
Gibson, E. J., *206*, *334*; 175, 177, 318
Gilchrist, M. B., *287*; 274
Gill, J. H., *493*; 482
Gill, N., *168*; 157
Gilliam, B. J., *412*; 400
Gilman, D. A., *206*; 177, 196, 203
Gilmore, G. E., *612*; 593
Glanzer, M., *577*; 543
Glaser, R., *206*, *207*, *358*, *577*; 180, 192, 543
Glass, G. V., *247*; 218, 219
Glidewell, J. C., *577*, *611*; 538, 539, 544, 560, 593
Glueck, E., *491*; 480, 481
Glueck, S., *491*; 480, 481
Gnagey, W. J., *26*; 12
Goble, F., *112*
Goethals, G. W., *610*, *635*; 593, 596, 620, 626, 628
Gold, M., *491*, *577*; 478, 543
Goldberg, M. L., *411*, *412*; 391, 394, 401
Goldin, P. C., *454*; 447, 448, 449
Goldman, B. A., *25*; 8
Good, S., *454*; 442
Good, T. L., *383*; 381
Goodlad, J. E., *411*; 399
Goodman, J., *99*; 86
Goodnow, J. J., *260*
Goodwin, W. R., *334*; 326
Gorton, R. A., *491*; 477
Goslin, D. A., *384*; 350, 376
Gottfried, N. W., *26*; 5
Goulet, L. R., *166*, *248*; 141, 225, 229
Grace, G. L., *166*; 156
Grambs, J. D., *25*, *636*; 9, 619, 620, 626, 628
Granlund, E., *411*; 391
Grant, D. L., *384*; 365
Greathouse, L., *490*
Green, J. A., *384*; 366
Greenberg, H., *525*; 513
Greenfield, P. M., *59*; 47
Greenwald, A. G., *206*, *207*; 202
Groff, P. J., *636*; 626
Gronlund, N. E., *611*; 534, 602
Grotelueschen, A., *248*; 220
Grubb, J., *413*; 391
Guardo, C. J., *578*; 536
Gubser, M. M., *636*; 619
Guilford, J. P., *98*; 83, 84, 85, 267
Gump, P. V., *578*
Gustafson, L., *525*; 515, 516
Guthrie, J. T., *248*; 235

Hagen, E. P., *385*, *637*; 345, 351, 619, 623, 624
Hall, D. T., *25*; 20, 21
Hall, J. F., *334*; 292
Hall, R. V., *578*; 571
Hall, V. C., *75*
Halle, M., *59*; 49
Halliwell, J. W., *411*; 397
Hammerlynck, L. A., *526*; 503
Hansen, D., *168*, *207*; 143, 199
Hardt, R. H., *411*, *491*; 394, 480, 481
Harlow, H. F., *166*, *334*; 147, 314
Harootunian, B., *286*; 263
Harrington, E. R., *577*; 562
Harrington, S. A., *247*; 218, 219
Harris, D. B., *611*; 594
Harris, J. A., *36*
Hartmann, H., 420
Hartnett, R. T., *526*; 512, 513
Hartsough, C. S., *611*; 594
Hartup, W. W., *578*; 534, 536, 540, 541, 553, 554, 555, 556, 560
Harvey, O. J., *578*; 548
Haskew, L. D., *27*, *637*; 18, 23, 618
Hathaway, S. R., *469*
Haubrick, V. F., *25*, *288*; 7, 271
Hauserman, N., *183*, *206*; 184
Havighurst, R. J., *25*, *491*, *524*, *525*, *636*; 13, 14, 392, 411, 471, 502, 520, 620, 624
Havumaki, S., *577*; 541
Hayes, M. L., *525*; 519
Heath, D. H., *611*; 589, 590
Hebb, D. O., *334*; 305
Heckhausen, H., *454*; 441
Heidbreder, E., *286*; 258
Heist, P., *411*, *528*; 389
Helson, H., *120*, *132*; 122
Henderson, K. B., *286*; 267
Hendrickson, G., *334*; 318, 320
Hendrix, G., *248*; 235, 237
Henjum, A., *25*; 20, 22
Henry, W. E., *474*
Herrick, V. E., *411*; 401
Hickey, A. E., *206*; 192
Higgins, M. J., *166*; 158
Highet, G., *25*, *411*; 14, 20, 400
Hilgard, E. R., *26*, *111*, *120*, *132*, *166*; 122, 137, 139, 154, 158, 282, 302, 500, 546, 547, 571
Hill, W. F., *111*, *116*; 120
Hilliard, T., *411*; 391
Himmelweit, H. T., *525*; 522
Hochman, L., *528*; 507, 508
Hodges, E. F., Jr., *493*; 482, 483, 521
Hoehn, A. J., *25*; 14
Hoetker, J., *526*; 516
Hoffman, M. L., *454*; 418
Hoffman, M. N. H., *206*; 185
Hoffmeister, J. K., *578*
Holding, D. H., *334*; 328
Holland, J. L., *491*; 470, 471
Hollingshead, A. B., *611*; 593
Hollister, W. G., *635*; 614, 617
Holt, J., *166*; 105, 157
Holtzman, W. H., *528*
Homme, L. E., *206*; 175
Honzik, M. P., *611*
Hoover, K. H., *576*; 538
Hopkins, K. D., *411*; 399
Horn, J. L., *98*; 86
Horowitz, A. B., *166*
Horowitz, B., *527*
Horrocks, J. E., *578*; 539
Hovland, C. I., *526*, *527*; 509, 511, 512, 513
Howe, M. J. A., *166*, *334*; 160, 161, 303, 304
Hoyt, K. B., *411*; 401, 403
Hudgins, B. R., *576*; 538
Hudgins, H. C., Jr., *636*; 628
Huggins, W. H., *333*; 299
Hughes, M. M., *25*; 18
Humphreys, E. H., *636*; 624
Hunkins, F. P., *166*, *286*; 161, 272
Hunnicutt, C. W., *169*; 156
Hunt, D. E., *411*; 394, 480, 481
Hunt, E. B., *248*; 238
Hunt, J., *493*; 476
Husén, T., *384*; 342

Iannaccone, L., *26*; 8
Illich, I., *491*; 468, 616
Inhelder, B., *99*; 64
Irion, A. L., *334*; 306, 310
Irwin, F., *115*
Isaacson, R. L., *26*; 12, 15
Ives, S., *287*; 282

Jackson, C. M., *36*
Jackson, J. M., *578*; 552
Jackson, P. W., *26*, *412*; 4, 5, 8, 9, 18, 23, 342, 407, 408
Jacob, P. E., *526*; 513
Jacobson, L., *384*; 381
Jahoda, M., *611*; 586
Jakobson, R., *59*; 49
Janssen, C., *491*; 469
Jarvik, L. F., *98*; 94, 95

Jenkins, J. R., *26*; 5, 6
Jensen, A. R., *60*, *98*, *248*, *612*; 41, 90, 95, 225, 599
Jerman, M., *208*; 194, 195
Jersild, A. T., *636*; 620, 621
John, P., *162*
Johnson, D. M., *248*; 240
Johnson, D. McE., *578*; 546
Johnson, D. W., *526*, *578*; 518, 519, 532
Johnson, L. V., *576*; 559
Johnson, J. M., *528*, *637*; 501, 626
Jones, C., *525*; 515
Jones, H. E., *454*; 419
Jones, J. G., *491*; 465
Jones, M. C., *492*; 460
Jones, R. L., *26*; 5
Jones, V., *526*; 504, 513
Jordan, A. M., *334*; 316
Judd, C. H., 320
Judson, A. J., *286*; 261, 262
Jung, J., *167*; 163
Justman, J., *411*; 394

Kagan, H. E., *526*; 519
Kagan, J., *98*, *99*; 86, 87, 88, 95
Kagan, S., *446*
Kanfer, F. H., *207*; 190
Kangas, J., *81*
Kaplan, J., *491*; 485
Kaplan, L., *611*; 593, 616, 618
Kaplan, S., *167*; 141
Kappy, M. S., *205*; 177
Katkovsky, W., *454*; 441, 442
Kaufmann, H., *454*; 435
Kausler, D. H., *167*; 151
Kay, A. W., *454*; 444
Keeler, M. H., *491*; 486
Keen, E., *112*
Keislar, E. R., *167*; 136
Keller, A. B., *474*
Keller, H., *11*
Kelley, H. H., *578*; 546
Keniston, K., *491*; 477
Keppel, G., *334*, *335*; 302, 309
Kerpelman, L. C., *476*
Kerr, W. D., *525*; 513
Kersh, B. Y., *248*; 235
Kessel, F. S., *107*
Kessen, W., *60*; 42
Kingsley, R. C., *75*
Kirkendall, L. A., *492*; 475
Kittell, J. E., *207*; 188
Klausmeier, H. J., *412*; 397, 600
Klein, D. C., *611*; 602
Klein, J. P., *412*; 394
Klein, M. M., *412*; 392
Klein, S. P., *286*; 257, 281
Kleinsmith, L. J., *167*; 141
Klineberg, O., *99*; 91
Knight, F. B., *334*; 316
Knowles, L., *411*; 391
Knowlton, J. Q., *526*; 503
Koch, S., *111*
Koehler, W., *120*
Koeppel, J., *167*; 151
Kogan, N., *167*; 156
Kohlberg, L., *454*, *455*, *526*; 418, 427, 503
Kornreich, L. B., *248*; 235, 236
Koslin, B. L., *526*
Koslin, S. C., *526*; 516
Kounin, J. S., *578*; 562, 564, 565, 566, 569, 570, 571, 573
Krathwol, D., *384*; 362
Kraus, S., *526*; 520
Krebs, D. L., *455*; 443, 444
Krueger, W. C. F., *334*; 310
Kuhn, T. S., *107*
Kulhavy, R. W., *205*; 195
Kulik, J. A., *479*

Ladd, E. T., *578*; 544, 561, 562
Lambert, N. M., *611*; 594
Lambert, P., *26*; 19
Lambert, W. E., *317*
Lane, P. A., *612*; 595
Langton, S., *492*; 477
Latta, R., *206*; 197
Laughlin, P. R., *286*; 256
Lawrence, D. H., *334*; 180, 201, 309, 326
Laxer, R. M., *412*; 394
Laycock, S. R., *636*; 620
Lazar, E. A., *636*
Lazarus, R. S., *611*; 584, 585
Learned, W. S., *412*; 386
Lee, D., *525*; 507
Lee, E. S., *99*; 94
Leeper, R. W., *167*; 137
Lehmann, I. J., *384*, *526*; 351, 512, 513, 515
Leicht, K. L., *248*; 219
Leith, G. O. M., *576*; 553
Lemke, E. A., *578*; 553
Lesser, G. S., *412*; 399, 537
Levenson, D. J., *524*
Levin, G. R., *207*; 197
Levin, H., *455*; 435
Levin, J. R., *226*; 225
Le Vine, R., *455*; 418
Levit, G., *576*; 545
Lewin, K., *578*; 558, 559
Lewis, D. J., *207*; 179
Lewis, W. W., *580*, *611*; 544, 595
Lichtenstein, A., *286*; 271, 513
Lichtenwalner, J. S., *281*
Liddle, G. P., *491*
Lieberman, M., *26*; 14, 624
Lindauer, M. S., *113*
Lindley, R. H., *249*; 225
Lippitt, R., *580*; 546
Lipset, S. M., *492*; 477
Litcher, J. H., *518*; 519
Little, K. B., *455*; 439
Locke, E. A., *167*; 151
Lockhart, R. S., *334*; 304
Lockhead, G. R., *167*; 163
Lodge, H. C., *526*; 502
Logan, T. H., *334*; 321
London, P., *454*; 443, 444
Long, K. K., *327*
Long, N. J., *578*; 559, 569
Loree, M. R., *384*; 345
Lorenz, K., *455*; 435
Lott, A. J., *578*; 533, 535
Lott, B. E., *578*; 533, 535
Lumsdaine, A. A., *207*; 192
Lundsteen, S. W., *286*; 265, 266
Lupton, A. A., *202*
Luria, A. R., *334*; 307

McAllister, L. W., *207*; 180, 203, 571, 572
McBain, W. N., *143*; 144
McCandless, B. R., *60*, *165*, *455*, *492*, *579*; 41, 430, 439, 458, 472, 536, 538, 605
McCarthy, D., *60*; 50
McClelland, D. C., *167*; 150
McClintock, C. G., *527*; 513
Maccoby, E. E., *455*; 449
McCord, J., *492*; 483
McCord, W., *492*; 483
McDougall, W. P., *334*; 307
MacFarlane, J. W., *611*; 594
McGeoch, J. A., *207*, *334*; 188, 306, 310
McGhee, P. E., *442*
McGuigan, F. J., *597*
McIntire, R., *183*; 184
McKeachie, W. J., *26*, *167*, *307*; 12, 15, 161
McKenna, B. H., *412*; 401
MacKinnon, D. W., *286*; 276
Mackler, B., *577*; 536
McLaughlin, J. W., *636*; 623, 625
Macmillan, D. L., *335*; 302
Macnamara, J., *317*
McNeill, D., *60*; 50
McNemar, O. W., *286*; 264, 265
Maddox, H., *335*; 328
Madsen, M. C., *446*
Mager, R. F., *384*; 360
Magoun, H. W., *167*; 139
Mahler, C., *384*; 372
Maier, N. R. F., *579*; 559
Mainer, R. E., *527*; 519
Maller, J. B., *167*; 156
Mallick, S. K., *455*; 439
Malmo, R. B., *167*; 139
Maltzman, I., *286*; 278
Manning, W. H., *384*; 341
Marcia, J. E., *492*; 465
Marks, E., *26*; 7
Marshall, H. H., *207*; 148, 158, 167, 177, 179
Marshall, H. R., *579*; 534
Martin, M., *26*, *168*; 4, 154
Martinson, W. D., *333*; 316
Marx, M. H., *167*; 148, 157, 162
Marzocco, F. N., *206*; 197
Masia, B. B., *384*; 362
Masling, J., *26*; 4, 5, 9
Maslow, A. H., *611*; 112, 600
Mason, G. P., *315*
Mathis, A., *207*; 198
Matthews, C. V., *491*
Matza, D., *493*; 478
Maxwell, J. W., *281*
May, R., *112*
Mayer, G. R., *455*; 439
Mead, M., *26*; 11, 13

Meadow, A., *287*; 277, 282
Means, G. H., *378*
Means, R. S., *378*
Mednick, S. A., *262*
Meeker, M., *27*; 13
Mehrens, W. A., *384*; 342, 351
Meichenbaum, D., *99*; 86
Meinke, D. L., *167*; 147
Melton, A. W., *335*; 306
Merki, D. J., *492*; 488
Mermelstein, E., *73*
Merrill, D. M., *335*; 311
Merrill, I. R., *332, 527*; 309, 513
Messer, S., *99*; 87
Metfessel, N. S., *636*; 624
Metzcus, R., *629*
Meyer, W. J., *527*; 501
Miles, G. J., *492*; 475
Milholland, J. E., *26*; 12, 15
Miller, D. R., *455*; 445
Miller, G. A., *123, 249*; 124, 220, 222
Miller, J. O., *92*
Miller, K. M., *527*; 519
Miller, K. S., *98*; 90
Miller, L. N., *527*; 504
Miller, N. E., *455*; 429
Miller, S. M., *286*; 256
Milt, H., *637*; 620
Milton, G. A., *286*; 263
Mischel, W., *99, 492*; 90, 481
Mitchell, J. V., Jr., *636*; 616
Monachesi, E. D., *469*
Mondani, M. S., *167*; 142
Montessori, M., 50, 148, 162, 177
Montgomery, R., *206*; 180
Moore, O. K., 148, 177
Moore, S. G., *438*
More, A. J., *178*
Morgan, C. T., *335*; 328
Morse, H. T., *611*; 603
Morse, W. C., *612*; 593
Mosher, D. L., *506*
Moss, I. L., *286*; 256
Mowrer, O. H., *455*; 429
Moyer, R. J., *527*; 510, 511
Mumbauer, C. C., *92*
Munro, B. C., *249*; 222
Murdoch, B. B., Jr., *334*; 304
Murphy, G., *167*; 156
Murphy, L. B., *167, 455*; 419
Musgrove, F., *612*; 599
Mussen, P., *60, 492*; 32, 460
Myers, A., *167*; 156
Myrow, D. L., *332*; 299

Nardine, F. E., *612*; 589, 590, 601, 607
Natkin, G., *335*; 311
NEA, *412*; 394, 400, 618
Neale, D. C., *168, 492*; 157, 467
Neisworth, J. T., *384*; 351
Neugarten, B. L., *25*; 13, 14, 620, 624
Newcomb, T. M., *167*
Newell, A., *287*; 253, 254
Newman, R. G., *578*; 559, 569
Newman, S. E., *223*; 222
Newsweek, *99*; 96
Nighswander, J. K., *455*; 439
Nunnery, M. Y., *412*; 400
Nuttin, J., *207*; 202
Nye, F. I., *493*; 480

Ofchus, L. T., *26*; 12
Offer, D. G., *492*; 465, 467, 477
Ojemann, R. H., *412, 612*; 401, 402, 599, 603
Olander, H. A., *636*; 620, 623, 628
Olander, H. T., *335*; 316
Oldridge, O. A., *411*; 399
Olds, H. F., Jr., *27*; 19
O'Leary, K. D., *579*; 569, 571
Olsen, R. E., *168*; 152
Olson, W. C., *612*; 602
Olton, R. M., *286*; 282
Olver, R. R., *59*; 47
O'Neil, A. M., *26*; 21
O'Neil, H. F., Jr., *168*; 141, 143
Oppenheimer, J. R., *348*
Osgood, S. W., *332*; 326
O'Shea, A. J., *579*; 551
Osipow, S. H., *472, 492*; 471
Ostreicher, L. M., *580*; 548, 549
Ostrovsky, E. S., *527*; 500
Overman, J. R., *335*; 318
Owen, S. G., *207*; 197

Page, E. B., *168*; 154
Paivio, A., *249*; 227
Palmero, D. S., *165*
Panyan, M., *578*
Pargament, R., *526*
Parke, R. D., *455*; 434, 435
Parnes, S. J., *287*; 277, 282
Parsley, K. M., Jr., *335*; 308
Passamanick, B., *39*
Passow, A. H., *411, 412*; 391, 394, 401
Patrick, C., *287*; 274
Patrick, E., *166*; 150, 158, 159
Patterson, D. G., *36*
Pattinson, W., *412*; 394
Payne, D. A., *384*; 360, 361, 362
Payne, D. C., *492*; 475
Pearson, L., *99*; 88
Peeck, J., *168*; 150, 376
Penfold, D. M., *287*; 267
Penney, R. K., *202*
Peters, C. C., *527*; 513
Peterson, D. R., *579, 612*; 563, 592
Peterson, H., *11*
Peterson, R. C., *527*; 520
Pettigrew, T. F., *260*
Phillips, B. N., *579*; 563
Phillips, E. L., *524*; 521
Phillips, L., *228*
Phye, G., *335*; 309
Piaget, J., *99*; 64, 229
Pidgeon, D. A., *384*; 365
Pierce, J. V., *491*
Pierson, J., *525*
Pierson, R. R., *26*; 7
Plant, W. T., *527*; 519
Polanyi, M., *107*
Pollock, M. B., *492*; 488
Popham, W. J., *153, 384*; 360
Poppleton, P. K., *207*; 197
Porter, D., *207*; 198
Portnoy, S., *249*
Postman, L., *168, 335, 336*; 146, 163, 296, 310
Potter, T. H., *491*; 465
Powell, M., *335*; 308
Prather, M., *578*
Premack, D., *168*; 145, 175
Prescott, D. A., *412*; 400
Pribram, K. H., *132*
Proshansky, H. M., *527*; 516, 517, 519, 520
Proshek, J. M., *492*; 467
Provus, M., *384*; 341
Purnell, R. F., *492*; 483

Quarter, J. J., *412*; 394
Quay, H. C., *579*; 563
Quay, L. C., *93, 579*; 563

Rabon, D., *578*
Rainwater, L., *492*; 461, 475
Randle, K., *578*; 553
Raph, J. B., *60, 412*; 57, 391
Ray, W. S., *286*; 255, 256
Read, H., *527*; 504
Redl, F., *579, 612*; 569, 602
Redlich, F. C., *611*; 593
Rees, R. D., *26*; 12, 13
Reese, E. P., *579*; 565
Reese, H. W., *249*; 225, 228
Reid, I. E., *288*; 271
Reid, J. B., *208*; 199
Reitman, S. W., *636*; 620
Reitz, H. J., *26*; 7
Rempel, A. M., *636*; 619
Reppucci, N. D., *99*; 86
Resnick, H., *472*
Reynolds, J., *358*
Reynolds, J. H., *206*; 180
Reynolds, M. C., *412*; 397
Reynolds, N. J., *412*; 401
Reynolds, P. C., *469*
Rhine, W. R., *579*; 553
Rhodes, F., *412*; 398
Rice, J., 164
Richardson, A., *168*; 163
Richardson, R. C., *635*; 620
Richardson, S., *578*; 536
Richter, C. P., *612*; 596
Riley, D. A., *249*; 228
Risley, T. R., *412*; 401
Ristow, L. W., *492*; 468, 470
Rivera, R. J., *492*; 482
Robertshaw, G. S., *578*; 553
Robinson, F. P., *168, 412*; 328, 330, 401
Rock, I., *168*; 163
Roderick, M. E., *205*; 190
Roe, A., *207*; 197
Roe, Anne, *493*; 471
Roe, K. V., *207*; 197
Rogers, C. R., *126*; 112
Rohwer, W. D., Jr., *248, 249*; 225, 229
Rokeach, M., *527*; 507, 508

Rosenberg, M., *493*; 472
Rosenbloom, P. C., *287*; 265
Rosenthal, A., *636*; 626
Rosenthal, F., *579*; 536
Rosenthal, R., *384*; 381
Rosenthal, T. L., *26*; 4, 154
Ross, D., *431*
Ross, S. A., 431
Roth, R., *411*; 391
Roth, R. H., *208*; 198
Rothkopf, E. Z., *168*; 150, 159
Rowell, J. A., *249*; 235
Royce, J., *579*; 536
Rubenstein, H., *168*; 159
Rudd, W. G. A., *637*; 620, 625
Runkel, P. J., *28*; 16
Rush, R. R., *287*, *412*; 282, 397
Rust, V. I., *287*; 267
Ryan, F. L., *335*; 302
Ryan, J. J., III, *578*
Ryan, T. A., *335*; 324
Ryan, T. J., *208*; 201
Ryans, D. G., *26*; 4, 5, 22
Ryerson, A. J., *455*; 448

St. John, N., *413*; 400
Salisbury, J. L., *527*
Salzinger, K., *208*, *249*; 179, 220
Sampson, E. C., *493*; 477
Sanford, R. N., *524*
Sarason, I. G., *493*; 482
Sarason, S. B., *579*; 568
Sarbin, T. R., *479*
Sassenrath, J. M., *208*; 178
Satterly, D. J., *25*; 5
Sattler, J. M., *385*; 380
Scales, H. H., *493*; 468, 470
Scammon, R. E., *36*
Scandrette, O. C., *579*; 539
Scandura, J. M., *249*, *287*; 218, 266
Scarpetti, W. L., *612*; 595
Schaefer, S., *56*
Schaie, K. W., *60*; 33
Schlosberg, H., *336*; 326
Schmidt, H. O., *168*; 156
Schmidt, R., *577*
Schpoont, S. H., *332*; 311
Schreiber, D., *493*; 469
Schroeder, W. H., *334*; 318
Schumer, H., *166*; 150, 158, 159
Schwitzgebel, R. L., *208*; 177, 193
Scodel, A., *506*
Scott, J. P., *60*; 39
Scott, W. A., *592*; 584, 586, 591
Scriven, M., *385*; 341, 363
Scudder, K. J., *493*; 478
Sears, P. S., *26*, *206*; 4, 139, 154, 158, 199, 282, 500, 546, 547, 571
Selfridge, J. A., *249*; 220
Seltzer, R. A., *208*; 196, 197
Sergiovanni, T. J., *629*
Setzafandt, A. O. H., *334*
Seward, J. P., *168*; 145
Shane, H. G., *413*; 392, 394
Shannon, D. C., *413*; 397
Shaplin, J. T., *27*; 19
Shaw, M. C., *413*; 391
Shea, J. T., *636*; 623, 624, 625
Shearer, J. W., *413*; 400
Sheehan, M. R., *111*
Sherif, M., *527*; 509
Sherman, B., *27*; 7
Sherman, S., *525*
Sherril, D., *527*; 503
Shipley, J. T., *637*; 614
Shockley, W. B., 96
Shores, J., *132*; 124
Short, J. F., Jr., *492*, *493*; 480, 482, 484
Shuell, T. J., *335*; 309
Shulman, L. S., *73*
Siegel, A. W., *146*, *169*; 147
Siegel, G., *526*; 516
Siegelman, E., *99*; 86
Silberberg, M. C., *493*; 480
Silberberg, N. E., *493*; 480
Silberman, M. L., *26*, *612*; 4, 602
Silver, M. J., *383*; 381
Simon, C. W., *166*; 142
Simon, H. A., *287*; 253, 254
Simon, J., *249*; 235
Simons, H. W., *527*; 510, 511
Sims, J. H., *474*
Sinha, B. K., *512*; 513
Sjogren, D. D., *248*, *385*; 220, 342
Skelton, R. B., *335*; 316
Skinner, B. F., *116*, *208*; 117, 118, 172–173, 181, 194
Skolnik, J., *493*; 477
Skuldt, K., *132*; 124
Slater, B. R., *168*; 144
Sluckin, W., *60*; 38, 40, 141
Smallenburg, H., *384*; 372
Smedslund, J., *249*; 243
Smith, B. O., *27*, *287*; 12, 267
Smith, G. M., *413*; 394
Smith, H. C., *578*; 546
Smith, H. P., *27*; 9
Smith, K. U., *208*; 174
Smith, M., *577*
Smith, M. B., *612*; 585
Smith, R. B., *413*; 391
Smith, R. M., *385*; 351, 363
Smith, T., *207*; 199
Smith, T. S., *209*; 179
Smith, W. W., *208*; 175
Snow, R. H., *637*; 623
Snyder, H. I., *123*
Solem, A. R., *579*; 559
Solomon, D., *335*; 307
Solomon, F., *59*; 50, 57, 394
Solomon, J. C., *637*; 623
Solomon, R., *208*; 202, 203
Sones, A. M., *335*; 312
Sowles, R. C., *493*; 482
Spaulding, R. L., *27*; 7, 282
Spearman, C. E., 79
Spielberger, C. D., *168*; 143
Spindler, G. D., *493*; 477
Spitzer, H. F., *413*; 401
SPSSI, *99*; 91
Staats, A. W., *208*, *287*; 181, 263
Staats, C. K., *208*; 181
Stackowiak, J. G., *572*
Stager, M., *332*; 299
Stahler, E., *335*; 311
Standlee, L. W., *153*
Staton, T. F., *493*; 475
Stein, K. B., *479*
Stember, C. H., *528*; 518, 519
Stephens, J. M., *168*, *169*, *208*; 12, 152, 154, 177, 184, 342, 379, 398, 401, 499, 624–632
Stern, G. G., *26*, *27*; 4, 5, 7, 9, 547
Stevenson, G. S., *637*; 620
Stevenson, H. W., *169*, *287*; 147, 263
Stiles, L. J., *525*; 520
Stinnett, T. M., *27*; 18, 23, 618
Stodolsky, S., *60*; 50
Stott, L. H., *80*
Stratton, R. P., *248*; 240
Strauss, P. S., *528*; 507, 508
Street, R. F., *221*
Strother, C. R., *60*; 33
Stroud, J. B., *335*; 308, 312
Strowig, R. W., *491*; 465
Sturges, P. S., *205*; 176
Sturges, P. T., *208*; 179
Suchman, E. A., *485*
Suehr, J. H., *637*; 619
Sullivan, H. J., *383*, *385*; 342, 362, 363
Sullivan, L. H., *11*
Sullivan, M. W., *597*
Super, D. E., *493*; 471
Suppes, P., *208*; 194, 195
Sutich, A. J., *112*; 113
Sutter, E. G., *208*, 199
Swallow, C. S., *611*; 593
Swanson, G. E., *455*; 445
Swift, B., *525*; 522
Symonds, P. M., *99*, *462*; 80, 599

Taft, R., *287*, *335*; 274, 306
Tait, C. D., Jr., *493*; 482, 483, 521
Tallmadge, G. K., *413*; 400
Tannenbaum, A. J., *493*; 468
Tate, M. W., *286*; 263
Taylor, P. H., *27*; 9, 12
Tedeschi, J. T., *335*; 309, 426
Teeters, N. K., *493*; 478
Tennyson, R. D., *140*
Tennyson, W. W., *493*; 470
Terrell, G., *208*; 177
Thelen, H. A., *413*; 399
Thibaut, J. W., *578*; 546
Thomas, E. J., *579*; 554
Thomas, J. A., *385*; 342
Thompson, G. G., *169*, *527*; 156, 501
Thompson, M. L., *637*; 616
Thomson, S. D., *27*; 17
Thorndike, E. L., 79, 116
Thorndike, R. L., *385*, *637*; 345, 351, 619, 623, 624
Thurstone, L. L., *99*, *527*; 82, 520
Tiedeman, S. C., *27*; 12
Tiger, L., 466
Tismer, W., *168*; 157
Tizard, J., *579*; 545
Tobias, S., *208*; 192, 197
Toler, A., *612*; 595

Tolman, E. C., *115*
Tombaugh, T. N., *167*; 148, 157, 162
Torbet, D. P., *385*; 363
Torrance, E. P., *169*, *288*, *612*; 156, 276, 277, 279, 603
Trabue, A., *528*; 504
Travers, R. M. W., *332*, *580*; 315, 553
Troutner, L. F., *112*
Trow, W. C., *336*; 313
Trowbridge, N., *288*; 282
Trubowitz, J., *528*; 517
Trump, L. L., *493*; 476
Tuckman, B. W., *27*; 20
Turiel, E., *526*; 427, 503
Turner, H. A., *527*; 513
Tussing, L., *336*; 328
Tutko, T. A., *167*; 142
Tyler, F. T., *385*, *413*; 358, 395
Tyler, L. E., *99*, *385*; 90, 94, 96, 372
Tyler, R. W., *385*; 342

Underwood, Billie, *26*; 4, 154
Underwood, B. J., *169*, *336*; 134, 228, 302, 306, 309, 310
United Nations, *493*; 478

Vacc, N. A., *612*; 596
Vacchiano, R. B., *528*; 507, 508
Van Dalsem, E., *411*; 390, 394
Van Riper, C., *49*
Vich, M. A., *112*; 113
Vincent, R. J., *493*; 486
Von Wright, J. M., *189*

Wagner, N. N., *494*; 474, 475
Walberg, H. J., *413*, *576*; 400, 401, 549
Wallach, M. A., *288*; 273, 389
Wallen, N. E., *27*, *288*, *580*; 9, 271, 553
Walls, R. T., *209*; 179
Walters, J., *528*; 513
Walters, R. H., *453*; 154, 426, 430, 432, 480, 481
Wandt, E., *580*; 548, 549
Wapner, S., *155*
Ward, M. H., *580*; 571
Ward, W. C., *288*; 278
Wardrop, J. L., *288*; 265
Warner, W. L., *27*; 13, 626
Warren, J. M., *334*; 314
Warren, T. F., *288*; 279
Waterman, A. S., *464*
Waterman, C. K., *464*
Watson, G. B., *580*; 546
Watson, P., *208*; 201
Watson, P. G., *209*; 197, 386
Wattenberg, W. W., *612*; 602, 605
Weatherley, D., *494*; 460
Weber, L. J., *168*; 152
Webster, H., *528*; 513
Wehling, L. J., *27*; 4, 5
Weinberg, S., *490*
Weinreb, J., *612*; 603
Weiss, R., *60*; 50
Welch, L., *99*; 88
Welch, W. W., *576*; 549
Wells, J. N., *249*; 218
Werner, E. E., *285*, *524*; 278, 282, 501
West, L. J., *490*; 487
West, R., *580*; 557
Westbury, I., *385*; 342
Westley, W. A., *491*; 477
Westman, J. C., *613*; 594
White, B. J., *578*
White, R. K., *580*; 546
White, R. W., *132*; 121, 147, 150, 420, 482
Whitlock, G. H., *209*; 197
Whitney, D. R., *491*; 470
Wickens, D. D., *333*; 327
Wiegand, V. K., *248*; 218, 219
Wiley, D. E., *385*; 341
Wilkins, L. T., *494*; 478, 482
Wilkins, M. C., *244*
Wilkinson, F. R., *412*; 401, 402
Willets, F. K., *490*; 477
Williams, B. M., *528*; 501, 626
Williams, H. M., *528*; 519
Williamson, M., *411*; 399
Wilson, R. C., *288*; 277
Wineman, D., *612*; 602
Wing, C. W., Jr., *288*; 273, 389
Wiseman, R., *249*; 235
Wiseman, S., *637*; 620, 625
Withall, J., *580*; 544
Witmer, H. L., *494*; 482
Wittrock, M. C., *336*; 318
Witty, P. A., *27*; 9
Wodtke, K. H., *334*; 321
Wohlwill, J. F., *209*; 190
Wolf, M. M., *524*; 521
Wolfenstein, M., *455*; 448
Wolfson, B. J., *26*; 4
Wolk, D. J., *494*; 484, 488
Wolpert, A. W., *637*; 624
Wood, B. D., *412*; 386
Wood, G., *249*; 227
Woodruff, A. D., *27*; 12
Woodworth, R. S., *111*, *336*; 145, 175, 326
Woolley, F. R., *140*
Worthen, B. R., *249*; 235
Wright, B., *27*; 7
Wright, H. F., *610*; 594
Wylie, R. C., *613*; 606
Wynns, F. C., *166*

Yando, R. M., *89*, *385*; 88, 380
Yates, A., *384*; 365
Yates, A. J., *209*; 174
Yates, F. A., *249*; 227
Yee, A. H., *27*, *28*, *132*, *613*; 4, 8, 14, 16, 124, 602
Yellott, J. I., Jr., *123*
Yonge, G. D., *208*; 178
Young, R. K., *528*; 514, 515, 519

Zeitlin, H., *580*; 562
Zelhart, P. F., *490*
Zigler, E., *385*, *455*; 380, 446
Zigler, E. F., *287*; 263
Zimmerman, B. J., *276*
Ziv, A., *613*; 595

Subject Index

Abstractions, learning of, 239
    in adolescence, 461–463
  in Piaget stages, concrete operations, 75–76
    formal operations, 77
Academic achievement, and classroom climate, 548
  in group-centered teaching, 546–547
  and sociability, 551
Acceleration, of gifted, 396–397
Acceptable behavior, in classroom, normality of, 573
Acceptable responses, eliciting, 180–181
Acceptance, by peers, fostering, 541–543
  vs. rejection, parental behavior, 447
  of student, in reprimanding, 571
  by teacher, and student self-concept, 606–607
Accepting help, and mental health, 588
Accommodation, in intellectual growth, 66
Achievement, urge toward, 441
Achievement (academic), individual differences, 386–388
  measurement of, 358–373
Achievement need, and culture group, 151, 158
  as motive, 150–151
Acquired drives, in socialization, 426
Acquisition, vs. performance, in imitation, 430
Acting out, vs. withdrawal, in classroom, 595
Activation, and attention, coordinating, 142–144
  and changes in competence, 144–145
  in effective study, 328–329
  management of, 139–145
  and response competition, 139–141
Activism, in adolescence, 476–477
  in psychological theory, 107
Activity, in effective study, 328–329
  for learning, 158–163
    answering questions, 161
    class discussions, 161–162
    listening, 160–161
    reading, 159
Activity, and motivation, 158–159
  as motive (Premack), 145
Adaptation level, and accommodation (Piaget), 67
  and belief system, 510
    classroom applications, 122–123
  and mental health norm, 584
  and partial reinforcement, 180
  theory of, 122–123
Addiction, vs. habituation, drug use, 484
Administration, measurement in, 341–342
  and teacher morale, 628
  teacher reaction to, 622
Administrative intervention, outcomes, 631
Administrative provisions, for diversity, 392
Adolescence, beginning of, 458–459
  health during, 456–458
  identity crisis in, 422
  years included, 458
Adolescent fantasy, frequent themes, 462
Adolescent groups, and youth culture, 477–478
Adolescent hostility, and the teacher, 599
Adolescent spurt, 34
Advance organizers, 215–216
  effect of, 217–219
  vs. post organizers, 219
Advances in education, from future technological breakthroughs, 632–634
Age, and readiness for learning, 350
Age changes, in altruism, 443
  in leadership factors, 556
  in mental health, 593
  in self-concept, 591
Age scores, in intelligence tests, 79–80, 353–354
  for older pupil, 354
  in standard achievement tests, 372
Aggression, and catharsis, 439–440
  constitutional factors, 437–438
  controlling, 436
  displacement of, mechanisms, 438
    in prejudice, 506, 508
  expression of, permitted forms, 436
    and social class, 436–437
  and frustration, 437
  imitation in, 439
  imitation of, 430–431
  instrumental vs. intrinsic, 435
  nature of, 435
  and popularity, 537
  punishment for, 439
  social values of, 435–436
Airplane glue (drug), and adolescence, 484–485
Alcohol, adolescent use of, 485
Allport, G., on functional autonomy, 145
Alternate hypotheses, in critical analysis, 269–270
Altruism, age and sex differences, 443–444
  motivation for, 443–444
Ambiguity in instructions, and discipline, 565
Anal stage, socialization, 419
Analysis (segmentation), aid to thought, 46
Anchor point, in belief system, 510
Androgen, and aggression, 437–438
Animal-human continuity, disagreement, 114
Animal training, behavior shaping in, 181–182
Answering questions, effects on memory, 304
Anticipation, during reading, 159
"Antiseptic bouncing," for discipline, 569
Anxiety, in creative thinking, 281
  effects of blame, 156

  during learning, retention and, 141
  and mental health, 587
  neurotic vs. reality, 587
  in problem solving, 257–258
  and response competition, 139–141
  from testing programs, 377
Aptitude, informing students of, 378
  (See also Measurement and Intelligence)
Arbitrary material, learning, and "gimmicks," 221
  prevalence in classroom, 299
Aristotle, as teacher of character, 14
Arithmetic, transfer in, 316
Arousal (motivation), management of, 139–145
Articulation (language), 48–50
  first-grade problems, 49
Artificial aids, in rote learning, 222–227
Assessment programs, national, 342
Assignments, for individual differences, 405–406
Assimilation, in concept development, 237–238
  in intellectual growth, 66
Association, as basis for learning, 117–118
Association value, and meaning, 213
Associations, in meaningful material, 212
Attachment behavior, and negative reinforcement, 434
  in socialization, 432–433
Attention, and arousal, coordinating, 142–144
  directed, effects, 145–147
  displacement of, in anxiety, 144
  maintaining, 142–143
  problem in underachievement, 142
  reinforcement from, 136
  from teacher, as motive, 154
Attitude, vs. belief and prejudice, 505–506
  change in, and college attendance, 512
    and classroom emphasis, 513–514
    lecture vs. discussion, 558
Attitudes, of teachers, 4
Audience, effect on decisions, 155
  effect on motivation, 154
Ausubel, D. P., on advance organizers, 217
  on learning by discovery, 235
  on mental health of introvert, 540–541
  on primacy of meaning, 210–212
  on readiness for learning, 229–230, 358
  on sex education, 475
Authoritarianism, and examinations, 377
Authority, and dogmatism, 507
  patterns of, in the classroom, 543–544
    measuring, 543
    teacher's place, 544
    varieties, 543–544
Auto Bridge, as teaching machine, 193
Automation, in teaching, 190–200
Autonomy, in adolescence, 465–466
  in child, parental attitude, 441
  crisis of (Erikson), 421
  need for, competent child, 608
    teachers, 6
Averages, in statistics, 641
Aversive stimuli (See Punishment)

Background factors, and cognitive style, 92
  in creativity, 281
  in intelligence, 90–96
    disagreement, 90–91
  and open-mindedness, 92
  and self-concept, 591
  and socialization, 450–451
Balance, energy-control, 588
Band (percentile), in individual profiles, 375
Basic needs, in stress situations, 600–601
Behavior excesses, and maladjustment, 595
Behavior problems, and teacher sensitivity, 594–595
Behavior shaping, in classroom, 181–183
    problems, 182
  and computerized instruction, 196
  and disciplinary infractions, 571–572
  and discriminated operant, 182
  vs. guidance, 181–182
  and incidental learning, 146–147
  and reform of delinquents, 520–522
  in remedial reading, 183
Behavioral objectives, context factors, 360
  and minimum performance, 360
  samples, 361
  and task requirements, 362
  and taxonomies, 362–363, 364
  vs. ultimate goals, 360–363
Behaviorism, 116–119
Belief system, closed mind, 507
  manipulation of, schoolroom, 509–510
  and personality factors, 506–507
  and prejudice, 508
  and problem of persuasion, 508–510
Beliefs, vs. attitudes and prejudice, 505–506
Bernstein, B., on communication style, 54
Bias in tests, cause of resentment, 379–380
Binary numbers, remembering, and chunking, 224
Binet, A., on intelligence, 79
Birth control, factors involved in use, 474
"Black" dialect, in testing black children, 93
Blame, as motive, 156–157
Bloom, B. S., on environment and intelligence, 94
  on growth of intelligence, 80
  on objectives in testing, 362
  on taxonomies, 363–364
Bluffing, in essay tests, 366
Body image, in adolescence, 459
"Boners," student, and problem of context, 233
Brain damage, and delinquency, 480–481
Brainstorming, in creative thinking, 281–282
  effectiveness of, 282
  procedures, 282
Branching programs, in programmed instruction, 191
Breakthrough, potential, in educational, technology, 632–634
Bruner, J. S., on function, of language, 47
  on importance of structure, 210
  on language development, 57
  on learning by discovery, 235
  on Piaget stages, 76
B-type (Maslow), search for tension, 138

CAI, 194–200
California vs. England, in teacher worries, 625
Cambridge-Somerville study, delinquency, 483
Case study, method, 32
Casual intervention, in disciplinary problems, 569
Casual reinforcement, in classroom, 176–177
  problems in extinction, 200
Casual tutorials, within classroom, 407–408
Catharsis, in reducing aggression, 439–440
Causal patterns, delinquency and home conditions, 481
  in parent-child relations, 451
Causality, grasp of, infant, 70
Causation (mechanical), as a given, 108

Chains of associations, in Gagné hierarchy, 230
Chaos (sensory), in infancy, 64
Character, and mental health, 591–592
Character education, dramatic failures, 14
  teacher and, 13, 14
Cheating, as moral issue, 503–504
Check list, for critical analysis, 269
Child development, methods of study, 32–33
Childhood grammars, 50–52
Children's Association Responding Test, 87
Child's control, of stress intensity, 603
Chi-square, test of significance, 667
Choral reading, as guidance, 186
Chunking, classroom applications, 222–225
  and labeling, 224–225
  as structure, 220
Class discussions, vs. lecture, 161–162
Classes (logical), child's grasp of, 71
  mastery of, 74
Classroom, group characteristics, 532
Classroom climate, general effects, 547–548
  separate facets of, 549
  and teacher's need system, 548
Classroom jobs, 18–19
Classroom procedures, in treating diversity, 399–407
Classroom rules, and pupil self-concept, 606–607
Climate, and prenatal development, 39
Clinician, teacher's cooperation with, 596
Clustering, and interaction effect, 295
  in meaningful material, 213
  structure from, 220
Closed mind, theory of, 507
Coefficient of correlation, examples, 652
  as a slope, 650–654
Coefficient of equivalence, and reliability, 347
Coefficients of predictive validity, interpretation, 346
Cognitions, as basis for morality, 423
Cognitive dissonance, acquired drive, in socialization, 426
  and retention, 309
Cognitive psychology, 111–112, 114–116
  mental givens, 114
  and partial reinforcement, 179
Cognitive structures, development of, 65
Cognitive theories of socialization, 423–426
Cognitive transformations, in teaching socialization, 502–505
Cohesive groups, efficiency of, 555
Cohort method, in child study, 33
College attendance, and attitude change, 512
  and prejudice, 518–519
College Entrance Board Examinations, scoring system, 646
College teaching, as a general model, 22–23
  typical obligations, 22–23
Communication style, and language development, 53–54
  and social class, 54–55
Community, teacher's place in, 14, 16
Community activities, of teachers, 627
Community improvement, and delinquency, 482
✓ Comparable scores, in coefficient of correlation, 653
  in statistics, comparisons between, 646–647
    purposes, 645–648
Competence, and confidence, coordinating, 607, 608
  level of, and activation, 144–145
  and mental health, 586
  as motive, (R. W. White), 150
Competent child, motivation for, 607–608
✓ Competition, and aspiration level, 156
  as classroom motive, 154, 156
Complexity, tolerance for, and creativity, 273
Components, of intelligence (Thurstone), 82
Comprehension, practice in absence of, 330
Computer-assisted instruction, 194–200
Computer "loops," in psychological theory, 124
Computers, model for problem solving, 254
  in psychological theory, 123–124
    TOTE sequence, 124
  in teaching, 194–200
Computers (instructional), absence of caprice, 196
  and behavior shaping, 196
  capabilities, 195–196
  flexibility of, 195–196
  general evaluation, 199–200
  for individualized instruction, 407–408
  in measuring readiness, 349–350
  vs. programmed text, 198
  relative effectiveness, 197
  social effects, 199
  student attitude to, 197–199
  types of, 194–195
Concentration (mental), effects on arousal, 142–143
Concept learning, age and, 238
Concepts, mastery of, in childhood, 71
  conjunctive vs. disjunctive, 238–239
  learning of, in Gagné hierarchy, 230
  nature of, 237–238
  relative difficulty, 238–239
  teaching of, 237–242
Conceptual tempo, 86–90
  age changes, 87–88
  classroom problems, 90
  constancy of, 87–88
  and creativity, 90
  influence of teacher, 88–89
  modification of, 90
  and school success, 87
Concomitants of learning, and transfer, 326
Concrete concepts, vs. abstract, ease of learning, 239
Concrete examples, in avoiding vagueness, 233–234
  guidance from, 232–233, 244–245
  in stage of concrete operations, 75–76
  in stage of formal operations, 77
Concrete operations (Piaget), attainment of, 71–73
  limitations, 75
  nature of, 73–76
  values of, 76
Conditioned response, and assimilation, 66
  as form of guidance, 183
  in Gagné hierarchy, 230
  in learning, 118
  and stimulus fading, 184
Confidence, and competence, interrelations, 607–608
  levels of, and significance, 663–665
  of teacher, and discipline, 564–565
Confirming student answer, as reinforcement, 177
Conforming student, characteristics, 553
Conformity, vs. diversity, classroom issue, 391
Conformity, pressures toward, 551–552
Conformity pressures, in adolescent groups, 466, 478
  areas covered, 552
  curtailing, leadership tasks, 559
  within individual, 552–553
  ranges of intensity, 552
Confusing roles, in morale of teachers, 620–622
Confusion, classroom, and discipline, 566

- Conservations (Piaget), development of, school influence, 73
  - effect of special training, 75
  - of number, 72–74
    - effect of school, 73
  - sense of conviction, 74
  - of substance, 72
  - of volume, 72, 74
  - of weight, 74
- Conservative guessing, in problem solving, 253–254
  - teaching, 256–257
  - as use of constraints, 254
- Consonants and vowels, in infant speech, 49
- Constancy of intellect, 80–81
- Constructed answer, in programmed instruction, 191–192
- Content validity, 345
- Content words, childhood grammar, 51
- Contingent reinforcement, deliberate use of, 176
- Continuities, historical, psychological theory, 128
- Continuity, vs. discrete steps, mathematical theories, 125–126
  - vs. stage theory, 45
- Constitutional factors, in aggression, 437–438
  - and delinquency, 480–481
- Constraints, use of in problem solving, 253–254
- Context, artificial, learning device, 225–226
  - concrete, as guidance, 232–233
  - in Gagné hierarchy, 231
  - and student "boners," 233
- Contextual linkages, in learning, 225
- Controversy, in psychological theory, 106
- Conventional level, socialization, 427
- Convergent thinking, 84
- Cooperation, classroom motive, 156
- Cooperative performance, vs. individual, 553–554
- Correlation (statistics), interpretations of, 654–655
  - estimates of, from difference in percents, 656–658
    - from inspection of tables, 648–650
    - from phi coefficient, 658
    - from reduction of scatter, 655–656
    - from slope, 650–654
  - measurement of, 648–654
  - tetrachoric, 658
- Cost-benefit analysis, 342–343
- Counseling, and delinquency prevention, 482–483
  - for isolated pupil, 542–543
  - for potential dropouts, 470
  - for underachiever, 390
- Court cases, use in socialization, 504
- Cross-sectional method, child study, 32
- Cross-sequential method, child study, 33
- Creative thinking, 272–282
  - vs. critical thinking, 272
  - and intelligence, 272–273
  - need for support, 280–281
  - stages in, 274–275
- Creativity, attitude of school people, 276–277
  - background factors in, 281
  - and conceptual tempo, 90
  - correlates of, 272–274, 281
  - familiarity with traditional, 279–280
  - fostering, 277–279
    - success in, 278
  - and neuroticism, 273–274
  - pressure toward, 275–276
  - support for, brainstorming, 281–282
- Criterion-referenced tests, vs. norm-referenced, 344
- Critical analysis, of published reports, 268–272
  - example, 268–270
  - relevant questions in, 268
- Critical attitude, sanctions against, 267–268
- Critical features (concepts), 239
  - vs. noncritical, 241
- Critical periods, in physical development, 38
  - and stage theory, 42
- Critical thinking, 267–272
  - definitions of, 267
  - fostering, classroom success, 270–272
- Criticism of others, and mental health, 588
- Crystallized intelligence, vs. fluid, 86
- Cue, role in discriminated operants, 172–173
- Cultural background, and socialization, 445–447
- Cultural bias in testing, morale factors, 380
- Cumulative deficit, in early learning, 41
- Curiosity, as motive, 148–149
- Curriculum development, role of measurement, 341–342

- Dating, in adolescense, 461
- *Davis-Eels Games Test*, 380
- Decay, as theory of forgetting, 306
- Deciding, effect of observer, 155
- Decision reaching, leadership task, 558–559
- Decoys, in multiple-choice questions, 371
- Deferred gratification, and delinquency, 481
  - and social class, 178–179
- Defense mechanisms, and mental health, 587
- Defensiveness, lack of, in creativity, 273
- Definitions, problems of, 106–107
  - of intelligence, 62
- Delay, in punishment, effects, 434–435
  - in reinforcement, effects, 177–178
- Delayed feedback, in acquisition vs. retention, 178
- Deliberate reinforcement, in classroom, 176
- Deliberation vs. spontaneity, in morality, 504–505
- Delinquency, 478–484
  - as cognitive deficit, 481
  - constitutional factors in, 480–481
  - cures for, behavior shaping, 520–522
    - and the school, 520–521
  - extent of, 478
  - as learned behavior, 481–482
  - and place of residence, 480
  - prevention of, effects of counseling, 521
    - school vs. other agencies, 520
  - types of, 479–480
- Delinquent, attitude to school, 480, 483–484
  - characteristics, 478–479
  - gang member vs. loner, 479–480
  - lack of masculine model, 482
- Delinquent slang, knowledge of, 479
- Dependency, in competent pupils, 608
  - excessive, and mental health, 589
  - and popularity, 538
- Dependency (emotional), 154
- Dependency motivation, 432–433
- Dependent variable (statistics), 649
- Depressant drugs, adolescent use of, 484
- Detour behavior, with extrinsic motives, 157
- Development, rate of, height, 33–34
- Deviation IQ's, 355
- "Devil group," as fanciful theory, 109
- Diagnostic programs, and the classroom, 409
- Diamond maze, learning experiment, 189

Differences, range of, in homogeneous grouping, 394–395
Differential assignments, for individual differences, 405–406
Differentiation, in physical growth, 36
Difficult tasks, role of transfer, 326
Direct approach, in reducing prejudice, 519–520
Direct contact, with pupils, and discipline, 566–567
Direct experience with moral issues, schoolroom, 503–504
Direct practice, vs. transfer, 327–328
Direct suggestion, in persuasion, 571
Directed learning, vs. incidental learning, 146
Disadvantaged child, characteristics, 389
Disapproval, as motive, 156
Disciplinary infractions, student awareness of, 570
  treating, 567–571
Disciplinary problems, and ambiguous instructions, 565
  and background factors, 563–565
  dimensions in, 563
  extent of, 562
  preventing, 564–571
  sociogenic vs. psychogenic approaches, 563
  and teacher self-confidence, 564–565
  teachers' worries about, 562
  treatment, behavior shaping and, 572
  types of, 562–563
Discipline, classroom, 561–574
  and hush-hush attitude, 561–562
  importance for teachers, 561
Discovery learning, vs. guidance, 235–237
    in learning of principles, 243–244
  and motivation, 148
  and problem solving, 253
  and set toward transfer, 324–325
Discriminated operant, and behavior shaping, 182
Discriminations, multiple, in Gagné hierarchy, 230
Discussion vs. lecture, 162
  in attitude change, 558
Disequilibrium, impact of language, 70
  in intellectual growth, 66
  and motivation, 138
Dispersion (statistical), measures of, 644–645
Displays, guidance from, 232, 234
Disruptive behavior, as discipline problem, 562
Dissillusionment among teachers, 622
Distinctiveness of responses, interaction effect, 297
Distraction, as extinction device, 201
  with high competence, 144–145
  and learning, 142–143
  problem in effective study, 330
Distribution of practices, and formation of sets, 262
  and reduction of interference, 301–302
    (See also Spaced practices)
Divergent thinking, classroom emphasis, 276
  and creativity, 272–273
  factor in intelligence, 84
  fostering, 277–278
    success in, 278
Diversity vs. conformity, classroom issue, 391
Dogmatism, aspects of, 507–508
  and college attendance, 512
  correlates of, 507–508
Drive stimulus, role in motivation, 136–137
Dropouts, in adolescence, 468–470
  characteristics of, 468–470
  factors involved, 468–470
  as failure of schools, 468
  occupational success of, 468–469
  and school differences, 470
Dropouts (potential), preventative steps, 470
Drug addiction, and reinforcement, 174
Drug education, 487–488
Drug use, in adolescence, 484–488
    experimental attitude, 486–487
    extent of, 484
  reinforcing effects from, 487
  social factors in, 487
  types of, 484
Drugs, widespread use, 486

Early maturation (physical), and popularity, 460
Early school entrance, 396–397
  teachers' attitudes, 397
Early success, arranging for, in problem solving, 265–266
    through transfer, 326
  in group skills, 560
  lack of, in creative thinking, 275
    in problem solving, 252–253
  in management of tensions, 597–598
"Eavesdropping" in casual tutorials, 408–409
Eclecticism in psychological theory, 129–130
Education, amount of, and prejudice, 518–519
Educational research, teacher's role, 106
Educational technology, future hopes, 632–634
Effectance, as classroom motive, 147–148
  in delinquent behavior, 482
Effective study, rules for, 328–331
Effort, during learning, and retention, 309
Ego, in ego theory, 121
  in Freudian theory, 119–120
Egocentricism, and intellectual growth, 72–73
Ego diffusion, in adolescence, 463
  identity crisis and, 422
Ego identity, in adolescence, 463–465
Ego integration, in adolescence, 465
  and school achievement, 465
Ego involvement, and creative thinking, 281–282
  and problem solving, 257
    reducing, 257–258, 260
Ego needs, in discovery learning, 237
  as motives, 150–151
Ego theory, 121
  in socialization, 420–422
Einstein, rejection of grotesque givens, 109
Elaborated style, in communication, 54
Embryology, as model for intellectual growth, 64–65
Emergent leader, characteristics of, 555–556
Emotional adjustment of teachers, 617
Emotional autonomy, in adolescence, 466
Emotional dependence, in socialization, 432–433
Emotional support, from teacher, in stress, 601–602
Empathy, and classroom structure, 540
Entrepreneur families, and children's values, 445
Environmental factors, in delinquency, 481
  in intelligence, 94–95
Equilibrium, in intellectual growth, 65–66
  in motivation, 137–138
  in stage of concrete operations, 76
  stage of formal operations, 78
Erikson, E., on ego theory, 121
  on identity crisis, 463–465
  on stages of socialization, 420–422
Error, inevitability of, 347–348
    in testing, 380–381

  probability of, and anxiety effects, 139–141
  role in science, 348
Error of estimate, and correlation, 656
Error (in measurement), and early school entrance, 397
Essay tests, 363–366
  advantages, 363
  bluffing in, 365–366
  disadvantages, 363, 365–366
  disagreement in marking, 365
  preparing, 366
  reliability of, 365
  scoring procedures, 366–367
Esteem, teacher experience of, 617–618
Ethnic composition of disadvantaged, 389
Ethnic differences, competition vs. cooperation, 446
Ethnocentrism, among ethnic subgroups, 515
Evaluation, in creative thinking, 274
Evaluation (educational), and decisions, 340
  vs. measurement, 340
  summative vs. formative, 341
  teacher's responsibilities, 343
Examinations, as motives, 152–154
Examination stress, relieving, 597
Excesses, in behavior, and maladjustment, 595
Excessive tension, in classroom, 596–598
Expansion of child's speech by parents, 53
Expectations (behavior-outcome), 115–116
  cognitive psychology, 115–116
  in reinforcement, 119
Expected verbal sequences as structure, 219–220
Experimental approach, educational research, 269
Expert advice, child rearing, vs. folklore, 450
    social class differences, 448
Explanations, in reprimands, value of, 569–570
  in science, 107–108
Exploration, as motive, 148
Ex post facto, approach, educational research, 269
Exposure learning, in classroom, 141–142, 146–147
  in effective study, 328
  and imitation, 429–430
  and imprinting, 40–41
Expressed interests, as motives, 157
Expression of emotion, beneficial effects, 598–599
Extinction of behavior, in classroom, 200
Extrinsic motives, vs. intrinsic, 157

Facial expression, as reinforcement, 175–176
Facilitation (learning), mutual, 292–298
  proactive, 295
  retroactive, 295
Factors of intelligence, number of, 78–85
  Thurstone theory, 82
Failing child, problem of confidence, 607–608
Failures (problem solving), value of, 258–259
Fair-mindedness, appearance of, in persuasion, 510
Familiar materials, in problem solving, 266
Familiar sequences, as structure, 219–220
Familiarity, as aspect of meaning, 213, 227–228
  of individual items, and meaning, 228
  in scientific "givens," 108–109
Familiarization, in effective study, 328–329
Fatherless boys, masculinity of, 449
Feedback, delay in, 178
  effects of distortion, 174–175
  immediacy of, and retention, 309
  inadequate, and morale of teachers, 623–624
Field forces, in psychological theory, 121–122
Field theory, in psychology, 109–110
Finality, impression of, from tests, 380–381
Fixed interval, reinforcement, 180
Fixed ratio, reinforcement, 180
Fluid intelligence, vs. crystallized, 86
Folklore vs. expert, child rearing, 450
Foreign language, transfer effects, 316–317
Forgetting, of academic materials, 307
  prevalence of, 307
  in summer vacation, 308
  theories of, 306
    (see also Retention)
Forgotten material, residual uses, 307–308
Formal language, and elaborative style, 54
Formal operations (Piaget), 77–78
  in adolescence, 461–463
Formative evaluation, vs. summative, 341
Foster children, in study of heredity, 96
Frequencies, expected vs. observed, 666–667
Frequency distribution, advantages of, 640–641
  interpretation, 640
Frequency polygon, depicting class performance, 373
Frequency of testing, and motivation, 152–154
Freudian theory, 119–120
  critiques and elaborations, 420
  and imitation-identification, 429–430
  and prejudice, 598
  and school's role in socialization, 499
  stages of socialization, 419–420
Friendships, factors involved, 539–540
  in school children, 539–540
  sex differences in, 539
  between sexes, 540
Frustration, and aggression, 437–438
  in home vs. school, 593–594
  intense vs. prolonged, 594
Frustrations of teachers, 619–628
  aspects of, 619–620
  dealing with, 619–620
Frustrative nonreward, 201
F-test, estimate of significance, 665–666
Functional autonomy, 145
  in extrinsic motivation, 157

G (general ability), 79
Gadgets, in providing reinforcement, 177
Gagné, R. M., on aspects of structure, 215
  on functions of memory, 305
  and future technology, 633
  on readiness for learning, 358, 229–231
  on teaching of concepts, 241
Gagné-type hierarchies, 230–231
General principles, vs. rules of thumb, in transfer, 320
Generativity vs. stagnation, crisis (Erikson), 422
Genetic factors in intelligence, 95–96
Genital stage of socialization, 419
Gestalt psychology, 120
  structure in, 214
Ghetto child, classroom problems of, 389
  language of, 55, 57–58
    school's attitude, 57
Gifted child, special schools for, 392–393
"Give aways," in objective tests, 370–371
"Givens," in scientific theories, 106–107
    imaginary, 110
Goal-seeking behavior, 114–115
Goal setting, in group-centered approach, 545

Goals, immediate, and effective study, 329
  of positive mental health, disagreement, 585–586
Goodenough-Harris Drawing Test, 380
Grade scores, in standard achievement tests, 372
Graded tasks, in concept learning, 241–242
  in experience with stress, 602–603
Graduate Record Examinations, scoring system, 646
Grammar, in childhood, 50
Grammatical distinctions, childhood, 51
Group, vs. individual, in problem solving, 553–554
  size of, and efficiency, 554–555
Group activities, types of, and classroom, 532
Group-centered approach, and academic achievement, 546–547
  attitude of students, 546
  characteristics, 545
  in classroom, 545–546
  separate facets of, 547
Group cohesion, and group-centered approach, 545–546
Group contacts, and prejudice, 516–517
Group discussions, and teacher morale, 620
Group functions, in classroom, 532–533
Group guidance, for special groups, 394
Group harmony, in group-centered approach, 545–546
Group loyalty, and ethnocentrism, 515
Group procedures, and individual reactions, 401, 403–405
Group relations, in adolescence, 466
Group tests of intelligence, 352–353
Group work, skill in, fostering, 559–560
Grouping of ideas, as structure, 220
Groupings, transient, in classroom, 406
Growth spurt, in puberty, 459
Guessing vs. "peeking," in memorizing, 185
Guessing, risky, in problem solving, 254–255
Guidance, for competent child, 608
  measurement used as, 341
  for special groups, 394
Guidance (learning), 182–186
  in creative thinking, 279
  vs. discovery, 235–237
    in concept learning, 241
    in mastery of principles, 243–244
  in mastery of principles, concrete examples, 244–245
  prevalence of, 184
  and reinforcement, overlapping, 186–188
    student self-selection, 404–405
  from teacher, in problem solving, 253
  in teaching concepts, 232–233
  vs. trial and error, 189
  values and limitations, 188–190

Habituation, vs. addiction, drug use, 484
Hair style, of teachers, and administration, 628
Hallucinogens, as drugs, 484–485
Handicaps, classroom treatment of, 389–391
Head start, experimental results, 95, 393
Height, changes in, 33–34
  prediction of, 37
Herbart, J., on importance of interest, 157
Heredity and intelligence, 95–96
  disagreements, 91
Heteronomous stage, socialization, 423
Hierarchies (Gagné), and assessing readiness, 357–358
  in learning of meanings, 230–231
  values and limitations, 230–231
Hierarchies of skills, and computer approach, 124
High-probability behavior, as reinforcement, 175
"Hinting," as guidance, 186
Histogram, in depicting class performance, 373
Historical characters, models for socialization, 502
Historical differences, parent-child relations, 448–449
Holt, J., on importance of interest, 157
Home background, and popularity, 538
  and school dropout, 468–469
Homogeneous grouping, effectiveness, 394–396
  remaining variation, 395
Hormones, and aggression, 437–438
Hostility, adolescent feelings of, 462
  and drug use, 486–487
  from students, effect on teacher, 599
How-to-study, rules for, 328–331
  student attitude, 328
Human Development Program (Bessell), in teaching for mental health, 603–605
Human Relations Club, in mental health program, 603
Humanistic protest, vs. mathematical elaboration, 126–127
Humanistic psychology, 107, 112–114
  choice of "givens," 111–112
  missionary aspect, 114
  student attitude toward, 113
  and uniqueness of individual, 388
Humiliation, from testing programs, 377–378
Hypocrisy in sexual attitudes, 474–475
Hypotheses, in critical analysis, 269–270
Hypothetical constructs, 110

Id, in Freudian psychology, 119–120
Ideational fluency, and creative thinking, 277–278
Identical twins, study of intelligence, 94–95
Identification, and imitation, 429–430
  with literary characters, 502
  and power, 430, 432
  in schoolroom, 500–502
  in socialization, 432
Identity, attainment of, 463–464
  and attitude to college, 464
Identity crisis, 422
  in adolescence, 463–465
Illness, during adolescence, 456, 458
Illumination, in creative thinking, 274–275
Illustrations, in concept learning, 240
Imagery and meaning, 213
  of individual items, 228–229
Images, in meaningful learning, 225
  in mnemonic systems, 227
"Imaginary" practice, effects, 163
Imitation, in altruism, 444
  and delinquency, 482
  in development of aggression, 439
  factors influencing, 430–431
  and identification, 429–430
  of literary characters, 502
  in schoolroom, 154, 500–502
  in socialization, 429–430, 431
Immediacy of reinforcement, effects, 177–178
Impoverished experience, and child development, 40–41
Imprinting, and critical periods, 38–39
  and early learning, 38–39
  and exposure learning, 40–41
Improvising, practice in, 279
Impulse, vs. control, in mental health, 587–588
Impulse control, in socialization, 418
Impulsivity, and delinquency, 480

  vs. reflection, 86
  and response competition, 141
Incidental learning, 146–147
Incompatible behavior, use in extinction, 201
Incompatible responses, and interaction effect, 297
Incongruous material, and motivation, 148–149
Incubation, in creative thinking, 274
Independence, adolescent issue, 465–466
  fostering, in socialization, 440
Independent variable (statistics), 649
Individual differences, within homogeneous groups, 394–395
  in intelligence, 80
  in problem solving, 263–264
  in reading ability, 386–388
Individual intelligence tests, 351–352
Individual reactions in group procedures, classroom use, 401, 403–405
Individualism, and creativity, 274
Individualized instruction, supplementary, in classroom, 407
Industry vs. inferiority, crisis (Erikson), 422
Ineffectiveness, feeling of, and teacher morale, 623–624
Infancy, extension of, in adolescent schooling, 467–468
Inference, statistical, 658, 667
Infractions, disciplinary, tolerating, 567–568
  treating, 567–571
Inhibition, proactive, 296
  retroactive, 296
Initiative (vs. guilt), crisis of (Erikson), 421–422
Insight in learning, 115–116
Inspiration, from literary characters, 502
Instrumental aggression, vs. intrinsic aggression, 435
Instrumental dependency, vs. emotional dependence, socialization, 432–433
  reducing, 440
Integrity, in self-concept, and mental health, 590
Intellectual achievement responsibility, 441–443
  and delinquency, 481
  and effectance, 148
  optimal amount, 442–443
  and school achievement, 441–442
Intellectual products (Guilford system), 84
Intelligence, adolescent changes, 461–463
  age scales, 79–80
  as aggregate of abilities, 78–81
  background factors and, 90–96
  and creativity, 272–273
  decline of, 82
  definitions of, 62, 78
  different contents, 83–84
  environmental effects, 94–95
  fluid vs. crystallized, 86
  growth of, 80, 82
    constancy, 80–81
  individual differences in, 80, 90–91
  multiple-factor theory, 82
  number of factors, 85
  and popularity, 536
  and problem solving, 263
  as several components, 81–82
  stability of, 81
  and student values, 447
  student's knowledge of own score, 378
  and test favoritism, 93–94
  three dimensional structure, 83–85
  and transfer, 321
  as unitary ability, 79–81
Intelligence quotient, deviation score, 355
  nature of, 355
  representative values, 356
  as standard score, 355, 646–647
Intelligence tests, group, 352–353
  individual, 351–352
  limitations, 350–351
  as measures of readiness, 350–357
  percentile ranks in scoring, 356–357
  sample items, 352
  teacher's use of, 350–351
  as tests of general achievement, 350–351
  values of, 350–351
Intention, in aggression, 435
  in behavior, 114–116
Intention to learn, as a motive, 145–146
Interests, as classroom motives, 157
Interference, basis for forgetting, 306
  in learning, 292–298
    reducing, 299–303
  vs. transfer, problem of choice, 321–322
Internal consistency, and reliability, 347
Internalization of sensori-motor schemata, 69
Interpersonal relations, in mental health, 588–589
Intervening variable, psychological theory, 110
Intervention, educational outcomes of, 631
Intimacy vs. isolation, crisis (Erikson), 422
Intrinsic motives, vs. extrinsic, 157
Invariance (Piaget theory), 65, 67–68
  formal operations and, 77–78
IQ, nature of, 355
    (See also Intelligence Quotient)
Invisible ink, in teaching devices, 193
Irreversibility, in physical development, 38
  in stage theory, 42
Isolate (sociogram), 535–536
Isolated pupil, treatment of, 541–543

Jesus, and character education, 14
Jingles and rhymes, as memory aids, 226–227
Job turnover, in teaching, 618

Keller, Helen, education of, 10
Kindergarten, and the male teacher, 626–627
Knowledge of results, delays in, 178
  motivation from, 151–152
  problem in teacher morale, 623–624
  as reinforcement, 174–175
  vivifying, 152
Kuhlmann-Anderson test, sample items, 352–353

Labeling, and chunking, 224–225
  and predifferentiation, 315
  and social class, 55
  and transfer, 314–315
Language, basis for disequilibrium, 70
  incidental functions of, 47
Language development, aspects of, 47–48
  grammatical rules, 48
  and the school, 46–47
  and social class, 54–58
  and understanding, 48
Languages (foreign), transfer effects, 316–317
Large groups, vs. small, effectiveness, 554–555
Latent period (Freud), in socialization, 419
Leader, appointed, 557
  elected, characteristics, 556–557
  emergent vs. official, 555–557

Leadership, and psychological distance, 550
  tasks in, 557–559
    resentment of, 557–558
Learning, amount of, and transfer, 323
  basic steps, 171–172
  concomitants of, and transfer, 326
  direction of, and the teacher, 11–12
  in infancy, sensitization and, 40–41
  passive (exposure learning), 40
  principles of, and concept learning, 239–240
  and retention, contrasts, 309
  in sleep, 141–142
  socialization as, 426, 428
  by teaching others, 327
Learning how to learn, (transfer), 314
Learning of principles, in Gagné hierarchy, 242
Lecture vs. discussion, 161–162
  in attitude change, 558
Lesson plans, teachers attitude toward, 6
Liking for teacher, and discipline, 573
Limitations, seen in perspective, in mental health, 590
Limited variable, method of child study, 32
Linear programs, in programmed learning, 190–191
Listening, activity during, 160
  automatic reinforcement during, 176
  prevalence in classroom, 160
Listless learning, with low activation, 141–142
Literature as source of models, in socialization, 502
Logical reasoning, aid from context, 244–245
Longitudinal study, method of child study, 32
Long-term memory, vs. short-term, 305–306
Lower-class child, language development, 54–55
Lower-order needs, vs. higher-order, in stress, 600–601
LSD, adolescent use of, 484–485

Machines, in instruction, 192–200
Male bonding, and adolescent groups, 466
Male teacher, in schoolroom socialization, 501
Manifest Anxiety Scale, 597
Manipulatory urges, as classroom motives, 147–148
Manual guidance, in learning, 184–185
Marijuana, adolescent use of, 484–485
Markers (linguistic), in childhood use, 51
"Marking on curve," and anxiety, 377–378
Masculine model, absence of, and delinquency, 482
  in kindergarten, 626–627
  in schoolroom, 500–501
Maslow, A. H., on hierarchy of needs, 600
  and motivation of self-actualizers, 138
    (See also Self-actualizers; Third Force)
Maslow hierarchy, in Human Development Program, 603–604
  in reaction to stress, 600–601
Matching teacher and child, 20–21
Material incentives, 158
Maternal behavior, and social class, 56
Mathemagenic devices (Rothkopf), effectiveness, 150
  and retention, 311–312
Mathematical theories (in psychology), 123, 124–129
  future values, 127–128
  vs. humanistic protest, 126–127
Maturation, and intellect (Piaget), 65
Mean, arithmetic, 641–642
Meaning (psychological), aspects of, 212–214
  in learning, 212
Meaningful material, retroactive inhibition and, 300
Meaningfulness, of isolated items, 227
  and retention, 309–310
Meanings, as goals of education, 229–230
Measurement, of isolated facts, objective tests, 368–369
Measurement, prevalence of, 338–340
Measurement (educational), in administration and research, 341–342
  basic concepts, 343–349
  broad effects, 376–382
  classroom uses, 340–341
  distorted emphasis in, 376–377
  vs. evaluation, 340
  feedback from, 340
  menaces and values, 381–382
  motivation from, 340–341
  and performance contracting, 362
  teachers attitudes to, 342
Mechanical rules, in transfer, 318, 320–321
Mechanistic givens, in S-R theory, 117
Median, advantages and disadvantages, 642
Mediating functions, for memory, 305
Mediating responses, and interaction effect, 297–298
Memorizing, rereading in, 185
Memory, distortions from recall, 304
  functions of, 305
  for mediational purpose, 305
  for permanent record, 305
  in prodigies, 307
  vs. retention test, 303
  short term, 224
    and computer theory, 124
    vs. long term, 305–306
  for temporary holding, 305
    (See also Retention)
Memory experts, and mnemonic systems, 227
Memory systems, 226–227
Menaces and values in educational testing, 381–382
Mental age, fluctuation in, 354
  interpretation of, 353–354
  norms for, 354
Mental health, and character or morality, 591–592
  constancy of, 594
  formal courses for, 604
  nature of, 582, 584–586
  negative vs. positive views, 584–586
  superior, indicators of, 592
  of teachers, 615–617
  teaching for, early success and, 602–603
    formal courses, 603–605
Mental illness, prevalence, 593
  in school children, 593
  types of, 586–589
Mental practice, effectiveness, 163
Metatheory, 107
Methods of teaching, effects of altering, 631
Middle-class values, and teacher attitudes, 13, 14
Mill, John Stuart, early education, 10
Miller, G. A., on expected verbal sequences, 220
  on TOTE and motivation, 137–138
  on TOTE sequences, 123–124
  on verbal chunks, 222–223
Mnemonic systems, 226–227
Model (imitation), influential factors, 430
Model (social), in pace setting, 154
Modifying behavior, basic steps, 171–172
Monotony, and arousal, 139
Montessori approach, 162
  and graded tasks, 162
  language, importance of, 50
  physical devices in, 148

  physical feedback, 148
  reinforcement in, 177
Moral realism (Piaget), in socialization, 423
Moral relativism (Piaget), in socialization, 423
Moral understanding, and delinquency, 481
Morale, of teachers, 619
  feeling of ineffectiveness, 623–624
Morality, and mental health, 591–592
Motivation, for becoming a teacher, 4
  in effective study, 329
  in learning and in performance, 134, 136
  mechanisms of, 139–145
  nature of, 138
  relation to reinforcement, 138
  and retention, 310
  in school learning, 136
  from testing programs, 374, 376
  theories of, 136–138
Motor skill, development of, directionality, 37–38
Multiethnic readers, and racial attitude, 518
Multiple-choice questions, vs. constructed answer, in programmed instruction, 192
  preparing, 370–371
Multiple-factor theory of intelligence, 82

Naming of objects, by young middle-class child, 55
National Assessment Program, 342
Needs (physiological), and motivation, 137
Negative instances, in problem solving, 259
Negative reinforcement, from termination of punishment, 203–204, 434
Negative view of mental health, vs. positive view, 585
Negativism, and skill in problem solving, 265
Negro children, "black" dialect in testing, 94
Neuroticism, and creativity, 273–274
Newton, and theoretical givens, 108
Nonconforming student, characteristics, 553
Nongraded school, effectiveness, 399
  and treatment of diversity, 398
Nonreversal shift, and labeling, 56
Norm, and adaptation level, 584
  departure from, and mental illness, 584
Norm-referenced tests, vs. criterion-referenced, 344
Normative data, in child study, 33
Norms, in child study, 33
  in educational measurement, 344
  as percentile ranks, 643
  in standard tests, 372–373
Note taking, effects of, 160
No-trial learning, and imitation, 430
Novelty, in creative thinking, 272
  as a motive, 148–149
Null condition (statistics), in populations, 602, 660
Null hypothesis, deductions from, 662
    in Chi-square, 666–667
  rejecting, risks in, 662–663

Objective merit, and creativity, 272, 275–276
Objective test items, avoiding ambiguity, 370–371
  preparing, 369–371
Objective tests, 367–371
  advantages, 367–368
  disadvantages, 367–368
  sequence of items, 371
  testing for broad principles, 368–369
Objectives, behavioral, in measurement, 360–363
    (See also Behavioral objectives)
  importance of, in measurement, 358
  proximate vs. ultimate, in testing, 361–362
  of standard tests, and problem of selecting, 372
Objectivity in science, challenged, 114
Observation, learning by, and imitation, 429–430
Observer, effect on decisions, 155
Occupational choice, in adolescence, approaches, 470–472
  and identity crisis, 465, 470
Occupational success, of dropouts, 468–469
Oedipus complex, in socialization, 419
One-trial learning, 163–164
  in mathematical theory, 126–127
Open book examinations, value of, 366
Openness to experience, and creativity, 273
Operant behavior, discriminated, 172–173
    role of cue, 172
  vs. S-R units, 117
  vs. respondent, 172
Operations, of intelligence (Guilford), 84–85
Oral stage, in socialization, 419
Orientation, in problem solving, 252
Originality, and creative thinking, 275–276
    fostering, 278–279
Other children as tutors, in socialization, 503
Other-directed personality, and mental health, 589
Out-of-school factors, and socialization, school's task, 499
Over-confident child, classroom aids, 608–609
"Overdwelling," in discipline, 570–571
Overlapping, as disciplinary technique, 566
Overlearning, and retention, 310
Overt preaching, in fostering socialization, 504

Parametric tests, vs. nonparametric, statistics, 665–667
Parent-child relations, causal patterns in, 451
  changing fashions, 448
  and delinquency, 480
  dimensions of, and outcomes, 451
  as guide for teacher, 606–607
  reports by children, 449–450
Parental attitude, and underachievement, 391
Parental behavior, factors or dimensions of, 447–448
Parental reactions, and language development, 55
Parents, and socialization of child, 447–451
Parsimony, in scientific theories, 117
Partial reinforcement, cognitive view, 179
  effects, 179–180
  theoretical explanations, 179–180
Passive voice, child's mastery of, 52
Patterns, in gestalt theory, 122
  prevalence of, in experience, 214
"Peeking," vs. guessing, in learning, 185
  in programmed instruction, 195
Peer relations, in classroom, 533
Peers, as tutors, in socialization, 503
Percentile band, and individual profiles, 375
Percentile ranks, in individual profiles, 374–375
  as norms, 643–644
  in standard achievement tests, 372
  vs. standard score, intelligence tests, 356–357
  use of, 642–644
Percents, difference in, as correlation, 656–658
Perception, clarification of, and reinforcement, 175
Performance, vs. acquisition, in imitation, 430
  role of motivation, 136
Performance contracting, and educational measurement, 362
Performance task (transfer), practice in, 324

Permissiveness, in beginning teachers, 8
  vs. control, parental behavior, 447
  and social class, 447
Perseverance, in creative thinking, 275
Persisting questions, in psychological theory, 128
Personality, of pupils, approved by teacher, 601
Personality dynamics, in vocational preparation, 371–372
Persuasion, and belief system, 508–510
  psychology of, 510–513
Phallic stage, in socialization, 419
Phi coefficient, estimate of correlation, 658
Phonemes, in infant verbalizing, 48–49
Physical activity, results of, as motive, 147–148
Physical changes, in adolescence, implications, 459–461
Physical defect, and intelligence, 95
Physical growth, regularities in, 35–36
Physical sciences, as models, psychological theory, 108–110, 117, 119
Physiological factors, in motivation, 137
Physiological feedback, as reinforcement, 174
Physiology, role in activation, 139
Physique, worries about, adolescents, 459–460
Piaget, J., on conservations, 72–75
  on developmental stages, of intellect, 68–78
  on equilibration, 65–67
  on intellectual development, 64–78
  on invariance, 67–68
  on logical classes, 71–72, 74–75
  on moral development, 423–424
  and motivation, 137
  and psychological theory, 108
  and readiness for learning, 229–230
  and school's role in socialization, 499
  and sources of givens, 108
  and teaching of concepts, 237–238
  and use of structure, 215
Piecemeal practice, in difficult tasks, 327
Piecemeal tasks, interference in, 293
Pivot words, childhood grammar, 51
Play therapy, for isolated pupils, 542
Political activism, in adolescence, 476
Popular student, characteristics, 536–538
Popularity, and aggression, 537
  correlates of, 536–538
  distribution of, 535–536
  fostering, 541–543
  and home background, 538
  indirect measures, 535
  and play therapy, 542
  and sociogram, 534–536
  and talkativeness, 536–538
Populations (statistical), inferences from samples, 658–667
    numerical estimates, 660–662
  vs. sample, 600–602
Positive after image, model for forgetting, 306
Positive goals in mental health, 584–586
  vs. negative goals, 585
Positive mental health, disagreement about goals, 585–586
  fostering, 605–609
  indications of, 589–592
Postconventional level, socialization, 427
Postquestion (Rothkopf), as motive, 159
  as organizers, 219
  and retention, 311
Practice, amount needed, 163–164
  cost of, and transfer, 325–326
  imaginary, 163
  types of, 158–164
    answering questions, 161
Practice periods, length of, effects, 302
Practice teaching, attitude change during, 8
  influence of classroom teacher, 8
Pragmatic tests, and predictive validity, 345
Praise, as motive, 156–157
Precepts, teaching by, in socialization, 504
Preconventional level, socialization, 427
Predictive validity, 345–346
  coefficients, interpreting, 346
  time lapse and, 346
Predifferentiation, classroom uses, 315
  in transfer, effectiveness, 314–315
Preempting, as guidance (in learning), 186
Prejudice, vs. attitude and belief, 505–506
  and belief system, 508
  characteristics of, 514–515
  in children, parental factors, 506
  correlates of, 514–516
  and dogmatism, 508
  effects of contacts, 516–517
  race awareness and preference, 516
  reducing, by direct teaching, 519–520
    effect of education, 518–519
    by school programs, 516–520
    in schoolroom approaches, 508–510, 514
Premack principle, in reinforcement, 175
Premature closure, and discovery learning, 237
  in learning of principles, 243
Prenatal conditions, and mental deficiency, 39
Preoperational period (Piaget), 71–73
Prequestions (Rothkopf), as motive, 150
  sensitizing effects, 376
Prerequisite skills, and readiness for learning, 352–358
    Gagné hierarchy, 357–358, 359
Prestige, in persuasion, 510
  and teacher morale, 624–626
Preventative programs, for delinquency, 482
Priggishness, problem, in socialization, 504–505
Primary grades, teachers in, male, 626–627
Principals, qualities preferred by teachers, 629
Principles, mastery of, in Gagné hierarchy, 230
  in transfer, mastery needed, 325
  transfer value of, 318–321
Proactive facilitation, 295
Proactive inhibition, 296
Probability, and statistical significance, 662
Problem solving, ability in, correlates of, 263–264
  and conceptual tempo, 90
  in Gagné hierarchy, 230
  group vs. individual, 553–554
  role of sets, 259–263
  role of subordinate capabilities, 266
  strategies in, 253–257
  success and failures in, use of, 258–259
  success in teaching of, 265
  trial and error in, 252
  two-string problem, 262
  utilizing errors, 257–259
Problems, awareness of, and creative thinking, 278
Products, intellectual (Guilford), 84
Profile, and individual test results, 374–375
Programmed instruction, 190–200
  branching programs, 191
  vs. classroom teaching, 197

  linear programs, 190–191
  relative effectiveness, 197
  role of programmed steps, 197
Programmed practice, and graded sequences, 162–163
Programmed text, vs. computer, 198
Project method, 407
Prompting, as guidance, 186
Proprioceptive stimuli, as reinforcement, 174
Protest (student), in adolescence, 476–477
Proximate objectives, vs. ultimate, in testing, 361–362
Proximity control, in disciplinary problems, 569
Psychoanalytic theories, 119–121
  critique and appraisal, 420
  and physical analogies, 119
Psychogenic approach, vs. sociogenic, socialization, 418
Psychological distance, and leadership, 550
  varying needs for, in teachers, 551
Psychological theory, controversy, attitude toward, 129–130
  eclectic approaches, 129–130
  persisting questions, 128
  teacher's use of, 105–106
Psychosexual stages, in socialization, 419–420
Psychotherapy, by teachers, dangers, 394
Puberty, and adolescence, 458–459
Pubescence, and puberty, 458–459
Public relations, and educational measurement, 342
Punchboards, as teaching machines, 193
Punishment, for aggression, effects, 439
  cautions in using, 203
  in classroom, 201–204
  vs. extinction, in classroom, 201
  immediacy of, socialization, 434–435
  vs. reward, 202
  in socialization, 433–435
  termination of, negative reinforcement, 433–434
  unpredictable effects, 201–202
Pupil, matched to teacher, 399–400
Pupils' answers, classroom management of, 405
Pupils' interests, as motives, 157
Pupil-teacher matching, 20
  effectiveness, 400
Purpose, as a given (psychological theory), 108

Questioning attitude, barriers, 267–268
Questions, activity in answering, 161
  answering, in effective study, 329–330
    memory effects, 304
  devising, in effective study, 329
  as motives, 159
    postquestions, 159
    prequestions, 159
    student constructed, 159
  relevant, in critical analysis, 268–269
  rhetorical, as guidance, 185
  teachers', 161
Quizzes, frequent, as motive, 152–154

Race, and self-concept, 591
Race awareness, and prejudice, 516
Race differences, intelligence, controversy, 90–93
    emotional reactions, 96
  in scholastic tests, 380
  self-concept, 606
Race preferences, age changes, 516
  effect of multiethnic readers, 518
  and prejudice, 516
Range of differences, in homogeneous groups, 394–395
Range (statistics), and dispersion, 644
Ranks, percentile, 642–644
Rashevsky's model, imitation behavior, 127
Raven Progressive Matrices Test, 380
Readers (multiethnic), and racial attitude, 518
Readiness, measuring, 349–350
  in teaching for meaning, 229–230
Reading, active nature of, 159
  anticipation in, 159
  automatic reinforcement during, 176
Reading ability, individual differences, 386, 388
Ready-made groups, educational investigation, 269
Realism, in self-concept, and mental health, 590
Reality, distortion of, 586–587
Rebukes, as motive, 156
Recall, effects on memory, 303–304
  as retention test, 303
Recitation, answering questions, and effective study, 329–330
  in unison, as guidance, 186
Recognition, of forgotten material, 308
  as retention test, 303
Reconstruction, as retention test, 303
Referral functions, teacher and disturbed pupils, 594
Reflectivity, and school success, 87
Reinforcement, amount of, guidance vs. discovery, 237
    managing, 179–180
  applied to model, imitation, 430–431
  automatic, delay in, 174–175
  complexities of, in socialization, 499–500
  as condition for learning, 173
  definitions of, 173
  delay in, 177–178
  deliberate vs. incidental, 176–177
  for delinquent behavior, 482
  from drug use, 487
  and early success, concept learning, 240
    guidance vs. discovery, 237
    role of transfer, 326–327
  and guidance, overlapping, 186–188
    student self-selection, 404–405
  and imitation, 429
  immediate physical results, 174–175
  irregularities in, and socialization, 428
  mechanisms involved, 119
  and motivation, 136, 138
  negative, and cessation of punishment, 203, 434
  physiological, 174
  as principle of learning, 118–119
  from reduction of uncertainty, 175
  schedules of, 180
    and reform of delinquents, 520
    in socialization, 428
  in socialization, complex outcomes, 428
  from spontaneous comments, 175–176
  from successful group work, 560–561
Reinforcements, deciding upon, common sense, 173–174
  illustrations of, 176
Rejection, by classmates, 535–536
  feeling of, mental health, 588–589
Relative standing, (measurement), vs. task requirements, 344
Relearning, of forgotten material, 308
  as retention test, 303
Reliability, amount required, 349
  of essay examinations, 363, 365
  lack of, dealing with, 347–348

  measuring, repeated test, 346–347
    split halves, 347
  in objective tests, 367–368
  and prevalence of error, 346–347
  vs. validity, 349
Remedial loops, in programmed instruction, 191
Remedial reading, and behavior shaping, 183
  and stimulus fading, 183
Remedial teaching, and classroom instruction, 409
Repetition, in learning, effects, 163–164
Reprimands, contingent, and classroom control, 572
  for disciplinary infractions, 569
  effectiveness of, factors, 434–435
  explanations and, 569–570
  mild vs. intense, in discipline, 569
  prompt vs. delayed, socialization, 434–435
  and socialization, 433–435
      (See also Punishment)
Reproof, in classroom, 201–204
      (See also Punishment, and Reprimands)
Rereading, as guidance, 185
Research attitude, fostering, 267
Research (educational), role of measurement, 341–342
Resistance to temptation, and inner controls, 444–445
Resonance, in problem solving, 254–255
Respondent behavior, vs. operant, 172
Responding, method of, programmed instruction, 191–192
Response competition, and anxiety, 139–141
  changes with competence, 141
Response similarity, aspects of, 298–299
Responses, different, and interaction effect, 295–296
  distinctiveness of, and interaction effect, 297
  identical, and interaction effect, 294–295
  incompatible, and interaction effect, 297
  means vs. ends, and interaction effect, 297–298
  similar, and interaction effect, 295–296
Responsive environment, reinforcement in, 177
Rest periods, effects of, 302–303
Restricted style, communication, 54
Retention (learning), of academic materials, 307
  and anxiety, during learning, 141
  of college subjects, 307
  and delayed feedback, 178
  and effort during learning, 309
  extent of, 307–308
  fostering, 303–312
  and learning, contrasts, 309
  of meaningful material, 309–310
    vs. arbitrary, 307
  and motivation, 310
  overlearning and, 310
  partial reinforcement and, 179
  review and, 310–312
  speed of learning and, 308–309
      (See also Memory)
Retention test, vs. memory, 303
Reticular division (nervous system), in arousal, 139
Retrieval (retention), in memory process, 303–304
  as signal detection, 304
Retroactive facilitation, 295
Retroactive inhibition, 296
  in connected prose, 300
  in meaningful material, 299–300
Reverberating circuits, in short-term memory, 305
Reversal shift, and labeling, 56
Reversibility, and concrete operations (Piaget), 74
Review, in effective study, 330
  and retention, 310–312
    value of, 160
Reward vs. punishment, 202
Rewards, material, classroom motivation and, 158
      (See also Reinforcement)
Rhetorical questions, as guidance, 185
Rhymes and jingles, as memory aids, 226–227
Right action, conceptions of (Kohlberg), 425–426, 427
Rigidity, and dogmatism, 507–508
Ripple effect, in class discipline, 564
Risk, acceptable, and statistical significance, 664
Risk taking, and problem solving, 254–255
Rival arguments, presenting, in persuasion, 511–513
Rival hypotheses, in critical analysis, 269–270
Rogers, C., on theory, 126
Rokeach, M., on belief system, 507–510
Roles of the teacher, impact, 9
Rosenthal effect, and test results, 381
Rote memory, artificial aids for, 222–227
Rules for effective study, 328–331
Rules of thumb, in transfer, 318–321

Sample, vs. population, 600–602
Sampling, of populations, errors in, 659–660
  of questions, essay test, 365
    in objective tests, 368
Sanctions, for sexual restraint in adolescence, 474–475
Savings method, as retention test, 303
Scapegoating, in group-centered approach, 546
Scatter, reduction in, estimate of correlation, 655–656
Schedules of reinforcement, 180
School achievement, and intellectual achievement responsibility, 441–442
      (See also Achievement, academic)
School adjustment, of delinquent, 480
School grades, as arbitrary classifications, 399
Schools, basic mechanisms of, 630
    research on, 633
  criticisms of, 616
  and delinquency, 483–484
  effectiveness of, critical thinking, 271–272
  emphasis of, academic vs. social, 498
    adolescent reactions, 467–468
    convergent vs. divergent thinking, 85
  importance of for adolescents, 467
  public expectations for socialization, 498
  responsibilities of, drug education, 487–488
    mental health, 593–594
    reducing delinquency, 520–521
    reducing prejudice, 514–520
    socialization, 498
  as socializing agencies, evaluation, 522
Scientific explanations, characteristics, 107–108
Search model, in problem solving, 255
Segmentation, in thought processes, 46
Self-actualization, fostering, 605–606
Self-actualizers (Maslow), relish for tension, 138
Self-blame, vs. self-criticism, 423–424
Self-concept, background factors and, 591, 606
  correlates of, 591
  fostering, 605–606
  and popularity, 536
  positive, and mental health, 589–590
  realistic, and mental health, 589–590
Self-concept approach, and vocational preparation, 471
Self-confidence, and positive mental health, 590
Self-control, vs. impulse, in mental health, 587–588

  and mental health, 587–588
  veneration of, historical, 587
Self-criticism, and delinquency, 481
  vs. self-blame, 423–424
Self-esteem, in adolescence, 465
  protecting, in over-confident child, 608–609
  and vocational commitment, 472
Self-governance, and end of adolescence, 458
Self-teaching materials, for individualized instruction, 407
Self-testing, by students, 378–379
Sensitization, and early learning, 40
Sensitizing effects of testing programs, 376
Sensori-motor schemata (Piaget), 69–70
  as symbols, 70
  usefulness of, 70
Separate schools for special groups, 392
Sequence of questions, objective tests, 371
Sequence of tasks, ordered, in learning, 162–163
  role of transfer, 327–328
Sequences, verbal, traditional, 219–220
Set, to learn, and transfer, 314
    as motive, 145–146
  toward originality, in creative thinking, 275
  toward transfer, 324–325
Sets (problem solving), 259–263
  acquiring and breaking, 261
  breaking, 262–263
  creating, 261–262
Sex, role in friendships, 539–540
Sex differences, in adolescent groupings, 466
  in altruism, 443
  in creativity, 281
  in delinquency, 479
  in ego integration, 465
  in friendship patterns, 539–540
  in imitation, 430
  in intellectual achievement responsibility, 442
  in problem solving, 263
  in self-concept, 591
  in teachers' attitudes, 5, 501
Sex education, outcomes, 475–476
  psychological factors, 475–476
Sex rivalry, as motive, 156
Sexual activity, in adolescence, 461
    changing patterns, 474–475
  societal regulation, 473–475
Sexual development, rate of, 35
Sexual maturity, 459
  aspects of, 459
Sexual patterns, cultural differences, 473
Sexual restraint, adolescence, arguments for, 474–475
Sexual revolution, and adolescence, 474–475
Short-term memory, and computer approach, 124
  nature of, 305–306
  in process of chunking, 224
  in theories of forgetting, 306
Side effects, of testing programs, 376–382
Sigma scores, in statistics, 646
Signal detection, and memory retrieval, 304
Signal learning, in Gagné hierarchy, 230
Significance (statistical), 663–667
  and acceptable risks, 664
  concept of, 663
  estimates of, nonparametric, 666–667
    numerical, 664–667
    parametric, 665–666
  interpreting, 663
  vs. practical significance, 663
Signs, linguistic, in child development, 51, 52
Silent reactions, during group recitations, 404–405
Similarity, emphasizing, in transfer, 322–323
  speaker-listener, and persuasion, 510–511
  in stimuli and responses, and interaction, 293–296
  of tasks, in transfer, 321–323
Size of steps, in programmed instruction, 191
Skinner, B. F., on behavior shaping, 181
  on discriminated operants, 172–173
  on freedom and dignity, 116
  on operants vs. respondent, 172
  on partial reinforcement, 179–180
  on punishment, 433–435
  on reinforcement, definition of, 173
    importance of, 118
  on socialization, 426–428
  on stimulus fading, 183
  on stimulus in psychological theory, 117
  on teaching machines, 194
Sleep, learning during, 141–142
Slope, estimate of correlation, 650–654
  cautions, 653–654
Small groups, vs. large, effectiveness, 554–555
Sociability, and academic achievement, 551
Social class, and achievement motivation, 158
  and achievement need, 151
  and arousal effects, 148
  and creativity, 281
  and delayed feedback, 178–179
  and disciplinary problems, 563
  and expression of aggression, 436–437
  and guilt feelings, 446–447
  and language development, 54–58
  and material rewards, effect of, 158
  and mental illness, 593
  and self-concept, 606
  and socialization achieved, 445–447
  and test favoritism, 92
  and test performance, morale, 380
Social conditions, as motives, 154–157
Social development, effects of computer instruction, 199
Social ideology, and identity crisis, 465
Social interests, differences in, respecting, 540–541
Socialization, absence of father and, 449
  background factors and, 450–451
  as learning, 426, 428
  school's success in, evaluation, 522
  and social class, cognitive factors, 446–447
  theories of, 418–428
Social restrictions on teachers, 627–628
Social skill, adolescent changes, 466
Social standing, in classroom, student awareness of, 540
Social understanding, stages of, 423–427
Sociogenic approach, vs. psychogenic, socialization, 416
Sociogenic factors, vs. psychogenic, in discipline, 563
Sociogenic requirements, in socialization, 418
Sociogram, in classroom, 533–534
  value of photographs, 533–534
    (See also Popularity)
Sociometric choices, constancy of, 534
Sociometric descriptions, of classroom relations, 533–534
  dependability, 533–534
Spaced practices, in reducing interference, 301–303

  theoretical difficulties, 302
  and total-time hypotheses, 302
Spearman, C. E., on intelligence, 79
Special education for handicapped, 392
Speed of learning and retention, 308–309
Spelling, transfer in, 316
Spontaneity, vs. deliberation, in morality, 504
Spontaneous forces, in teaching, 627–632
Spontaneous mechanisms, in schooling, support for research, 633–634
Spontaneous schooling (theory), criticisms of, 632
Spontaneous self-expression in teaching, 632
S-R connections vs. discriminate operants, 172–173
Stability of intelligence, 81
Stage theory, arguments for, 45–46
  vs. continuity, 42–43, 45
  features of, 42
  in socialization, 419–426
  and tautology, 44
Stages, and critical periods, 38–39
  in development, controversy, 42–46
  effect of experience, 43–44
  in morality, and school's efforts, 499
  Piaget theory, 68–69
Standard deviation, characteristics, 644–645
  in sampling error, 659
✓ Standard error of estimate, as measure of unreliability, 347–348
Standard scores, in individual profiles, 375
  and IQ's, 355
  in statistics, 646
Standard tests, 371–373
  advantages and disadvantages, 371–372
  norms in, 372–373
  selecting, 373
Standard to be met, change of, in behavior shaping, 181
  immediate vs. remote, 152
  as motive, 151–152
Stanford-Binet test, 351–352
Stanines, in individual profiles, 375
  in scoring essay tests, 367
  as standard scores, 647–648
Statistical inference, 658–667
Stature, adolescent changes in, 460–461
  changes in, 33–34
  prediction of, 37
Stereotypes of teachers, 626–627
Stimulation, effects of early deficit in, 40–41
  intellectual, and social class differences, 94–95
  need for, 39–40
Stimuli, as cues, discriminated operants, 172–173
  different, and interference, 293
  identical, and interaction effects, 295–296
  similar, and interaction effects, 295–296
  similarity between, aspects of, 298–299
Stimulus fading, 183
  and conditioned response, 184
  and remedial reading, 183
Stimulus hunger, and critical periods, 39–40
Stimulus-response associations, in Gagné hierarchy, 230
Stimulus-response theory, 116–119
  and physical givens, 117
  and socialization, 426–428
Strategies, in problem solving, 253–257
  announcement of, 256
  in transfer, 318
Street argot, delinquents' knowledge of, 479
Street workers, and delinquency reduction, 483
Striving, and positive mental health, 590
Structure, as aid to retention, 309–310
  coherent, and meaning, 214
  in combating interference, 299–301
  dominance of, 214–215
  as an educational objective, 222
  elusive, highlighting, 220–227
  experienced by student (vs. teacher), 222–223
  in gestalt psychology, 122
  grasp of, in effective study, 329
  immunity to interference, 292–293
  influence on learning, 212
  intrinsic, use of, 219–220
  prevalence of, 214–215
  in problems, and ease of solution, 266–267
  and retention, 307–308
  and retroactive inhibition, 299–300
  superordinate, use of, 215–216
  of tension, benefits, 598
  of uncertainty, in critical analysis, 269–270
Structure of the intellect, 83–85
  educational significance, 85
Structures, intellectual, Piaget, 64–65
  separate, in reducing interference, 300–301
Student attitudes toward group-centered teaching, 546
Student behavior, effect on teachers, 6
Student hostility, and teacher morale, 622–623
Student initiative, and motivation, 151
Students, opinions about teachers, 9, 11, 12, 13, 15
  personalities of, and teacher approval, 601
Study, effective, rules for, 328–331
Styles of teaching, 19–20
  matched to pupil needs, 20–21
Subordinate capabilities, in problem solving, 266
  vs. superordinate categories, 214–215
Success, urge for, as motive, 152–153
Successes, in problem solving, use of, 258
Successful teaching, variety in approaches, 23
Sullivan, Anne Mansfield, as teacher, 10
Summative evaluation, vs. formative, 341
Summer vacation, forgetting during, 308
Superego, function of, 120
  and socialization, 419
Superordinate categories (See Advance organizers)
Supplemental stimuli, in guidance, 184
  and behavior shaping, 183
Supplementary programs for special groups, 393–394
Support, for creative thinking, 280–282
Supportive teacher, and classroom stress, 601–602
  effect on children, 154
Surface behavior, as legitimate concern, 561–562
Surrender signals, in control of aggression, 435
Syllogisms, skill in using, and context, 244–245
Symbols, sensori-motor schemata as, 70
Sympathetic associates, and street gangs, 483
Syntax, childhood mastery of, 50
Systematic elimination, strategy in problem solving, 253

Tables, in estimating correlation, 648–650
Taking notes, value of, 160
Talented students, encouraging, 389
Talkative student, and popularity, 536–538
Task analysis, in computer approach, 123, 124
Task oriented attitude, and class discipline, 564
Task requirements (measurement), and behavioral objectives, 362

  - and reduction of anxiety, 377–378
  - vs. relative standing, 344
- Taxonomies, and behavioral objectives, 362, 364
- Teacher, acceptance of student, in reprimanding, 571
  - approval by, and acceptance by, classmates, 541
  - assertiveness of, and discipline, 567
  - in authority pattern, 544
  - and child's self-concept, 605–606
  - vs. clinician, views of problem behavior, 594–595
  - concern for pupils, and discipline, 566
  - confidence expressed by, and discipline, 564–565
  - expectations by, and pupil performance, 381
  - instructional skill of, student reaction to, 12
  - need system of, and classroom climate, 548
  - stereotype in literature, 626–627
  - as symbol of culture, 12
  - understanding of pupil, effects, 401, 402–403
    - (See also Teachers, Teaching)
- Teacher-centered attitude, in beginning teachers, 8–9
- Teachers, academic ability of, 7
  - as amateur psychiatrists, 594
  - as appointed leaders, 556
  - attitudes of, toward creativity, 282
    - to early school entrance, 397
    - to intelligence tests, 351
    - to measurement, 342
    - to sex differences, 501
    - sex differences in, 5
    - to traits of principals, 629
  - authority of, legal considerations, 544
  - beginning, problems of, 7
  - and character education, 13
  - characteristics of, student opinions, 15
  - and children, matching, 20
  - classroom behavior of, 18
  - classroom function of, 18–19
  - community activities of, 627
  - community attitude toward, 12, 13
  - community image of, 14, 16
  - competition among, 616
  - conceptual tempo of, effect on pupil, 88–89
  - concerns of, 4, 19–20
    - for children, 4, 9
    - pattern of, 5
  - cooperation with clinician, 596
  - as directors of learning, 11–12
  - disillusionment among, 622
  - and educational research, 106
  - emotional support from, group-centered approach, 545
  - emphasis on subject matter, 5
  - expressed worries of, 616
  - in eyes of pupils, 9, 12
  - and hostility of students, 622–623
  - liking for children, 4
  - and machines, relative effectiveness, 196–197
  - vs. machines, 199–200
  - matched to pupils, 399–400
  - mental illness in, 615–617
  - and middle-class values, 13, 14
  - morale of, age differences, 619
    - sex differences, 619
  - need for theory, 105
  - nonprofessional duties, and morale, 624
  - obligations of, 632
  - outstanding, characteristics of, 6–7
  - physical health of, 618
  - popular, characteristics of, 9, 11
  - and problem of discipline, 561–562
  - problems with superiors, 622
  - and psychological distance, varying needs, 551
  - pupils preferred by, 601
  - questioning by, time spent in, 161
  - referral functions, mental illness, 594
  - reinforcement from, relative impact, 176–177
  - relations to colleagues, 14
  - responsibilities of, for evaluation, 343
    - for intelligence testing, 351
    - for mental health, 593–594
  - restrictions on dress, 628
  - roles of, 9
    - source of confusion, 620–622
  - salaries and pensions, 618
  - sensitivity to behavior problems, 594–595
  - sex differences in, disciplinary problems, 563
  - social activities of, 627–628
  - for special groups, qualifications, 394
  - stress given to divergent thinking, 276
  - student attitude toward, 13
  - and student hostility, 599
  - as substitute parents, 9, 11
  - supportive, and classroom stress, 601–602
    - influence of, 154
  - transiency among, 7, 16, 618
  - views of problem behavior, 594–595
    - (See also Teacher, Teaching)
- Teaching, as an ancient process, 628–630
  - as a career, motives, 4, 7
  - in college, atypical features of, 22–23
  - dimensions of, 4, 5, 19–20
    - at different age levels, 21–22
  - feedback from student behavior, 6
  - frustrations, multiplicity of roles, 16
    - and rewards, 9
  - initiation into, 7, 8
  - natural tendencies and, 628–632
  - nondeliberative aspects of, 629–632
  - as a profession, 14
    - relative prestige, 624–626
  - reported satisfactions of, 616
  - reputed value of, 626
  - as self-expression, 4, 5, 6, 18–19, 632
  - success in, variety of approaches, 10–11, 16, 19–23
  - unintentional, in primitive conditions, 630
  - varieties of, 10–11
  - work load, 17, 618
    - (See also Teacher, Teachers)
- Teaching machines, 192–200
  - evaluation of, 199–200
  - for individualized instruction, 407
  - types of, 192–194
- Teaching others, as aid to learning, 327
- Teaching style, effect on pupil, 88–89
- Team teaching, 19
  - in dealing with diversity, 397–398
  - effectiveness, 397–398, 399
- Telling time, hierarchical tasks in, 359
- Temptation, resisting, factors involved, 444–445
    - and inner controls, 444–445
- Tension, coping with, in classroom, 598
    - general aids, 602–605
  - keeping within bounds, 596–598
  - necessary degree of, in classroom, 138
  - prolonged vs. short-term, 596
  - reducing to manageable level, 598–599

  search for, and self-actualization, 138
  skill in coping with, fostering, 602–605
Test anxiety, relieving, 597
Test bias, student resentment, 379–380
Test favoritism, and background factors, intelligence, 93–94
Testing, and anxiety, 377–378
  vs. instruction, relative emphasis, 376–377
  motivating effect, 374
Test results, for individual, 374–375
  as motives, 373–374
  returned to students, 152
  utilizing, for class as a group, 373–374
Test scores, as estimates, 380
Test taking, as a motive, 151
Tests, frequent, as motive, 152–154
Tetrachoric correlation, 658
Theories, of forgetting, 306
  of motivation, 136–138
  psychological, general treatments, 111
    value to teacher, 91, 105
  of socialization, 418–428
  unusual givens in, 108–110
Theory, attitude toward, beginning teachers, 8
  prevalence of, 105
Therapy for teachers, 620–621
"Third force," psychological theory, 112–114
Time of day, and disciplinary problems, 565
Time scale, as transfer device, 319
Tolerating infractions, in discipline, 567–568
    vs. ignoring, 568
Total-time hypotheses, 302
TOTE model, in motivation, 137–138
  in psychological theory, 124
Traditional material, familiarity with, in creative thinking, 279–280
Training programs for mental health, 603–605
Training task, and immediate transfer, 324
  mastery of, and transfer, 323
  variety in, 323–324
Trait-factor approach, in vocational preparation, 470–471
Tranquilizers, dependence on, 486
Transfer (of learning), 312–328
  automatic, use of, 313
  vs. direct practice, 325–328
  and early reinforcement, 326–327
  and guidance vs. discovery, 235
  historical positions, 312–313
  and interference facilitation, 312
  vs. interference, risks, 321–322
  vs. learning, relations, 312
  and reducing costly practice, 325–326
  relying on, 325–328
  role of training task, 323–324
  in school subjects, extent of, 316
    and training task, delay in application of, 324
True-false questions, preparing, 369–370
Trust, crisis of (Erikson), 421
T-test, estimate of significance, 665–666
Tuition, and manual guidance, 184–185
"Tuning out," and reprimands, 434
Tutoring, casual, in classroom, 407–408
  by classmates, in socialization, 503
Two-string problem, 262
Tyler, R. W., on broad effects of testing, 373
  on educational evaluation, 342

Ultimate sanctions, in discipline, 573
Uncertainty, of testing procedures, acceptance of, 380–381
Underachievement, early signs of, 391
  family background and, 391
  problem of measurement, 390–391
  value of counseling, 390
Underachiever, attitude of, 391
  characteristics of, 389–391
  inattention in, 142
Understanding each pupil, difficulties, 400
  effects, 401, 402–403
Understanding, moral, and delinquency, 481
  role in socialization, 423
Unintentional learning (See Incidental learning)
Uniqueness of each student, 388
Unreliability of measurements, 346–348
  prevalence of, 347–348
Unusual objects, as motivation, 148–149
Upward Bound, 393–394

Vacation, summer, and forgetting, 308
Validity, content, 345
  in measurement, 345–346
  predictive, 345–346
  vs. reliability, 349
Valued activity, as motive, 145
  as reinforcement, 175
Variable interval, reinforcement, 180
Variable ratio, reinforcement, 180
Verbal association, in Gagné hierarchy, 230
Verbalization, rate of, childhood, 53
Video-tape, in teacher training, 8
Vocabulary, growth in, 50
Vocational commitment, and self-esteem, 472
Vocational preparation, different approaches, 470–473
Vowels, and consonants, infant speech, 49

Warm-up, in transfer, 314
Wechsler Intelligence Scale for Children, 351–352
White, R. W., on effectance, 147
    and competence, 150
    and delinquency, 482
WISC, 351–352
"Withitness," in class discipline, 569
Woodworth, R. S., on motivation, 145
  on reinforcement from perception, 175
Woolson, Moses, as a teacher, 11
Word associations, childhood, 51
Work load, of teachers, 17, 618
Writing (creative), skill in, measuring, 366
Wrong guesses, in problem solving, utilizing, 257–258

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